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Odour

THE sense of smell is one that living beings put to an amazing variety of uses and has a profound bearing on the lives of most humans and animals. The peculiar and never-to-be-forgotten smells of the East, the odour of disinfectant and chloroform, each brings flooding upon the memory vivid sensations, pleasurable or the reverse. Ability to detect the taint of decay by the sense of smell prevents many cases of food poisoning. Civilised man warns himself of the presence of dangerous gases by this sense; a vast chemical industry is founded on the production of perfumes; the chemist finds his nose to be a valuable aid to chemical analysis and his very existence is rendered evident to the outside world by "stinks."

Yet strange to relate there is no acknowledged scientific basis for the explanation of odour. Workers upon the subject have discovered certain facts, but these do not appear to have been correlated into a general theory. The filling of this gap was the purpose of Dr. Malcolm Dyson's paper on the scientific basis of odour presented at a recent meeting of the Society of Chemical Industry. The physiological basis of the sense of smell is quite well understood. It is sufficient for present purposes to regard the nose as containing numbers of cone-like cells, the wide mouths of the cones facing the nasal opening and the apexes being connected to the brain by nerves. When the cones have collected whatever may be the exciting cause of smell, a stimulus is transmitted to the brain and we become aware of an odour. The cells appear to be coated with fatty substances and the olefactory organs in general are covered with an aqueous secretion through which the smell-exciting impulse must pass.

The nature of the smell-exciting impulse has long been in dispute. It has been held to consist of vibrations, such as those of light or sound, and it has been ascribed to material particles. Dr. Dyson claims that it has been established that the presence of material particles is necessary and that the presence of a substance cannot be detected unless molecules of it actually enter the nose. The quantities of substances that are necessary for scent to become apparent vary very considerably. So small a quantity of trichlorphenol as 10^{-11} grams can be smelt—but this contains 30,000 million molecules. Apart from these variations in specific odour-producing power, Dr. Dyson concludes that it is necessary if a substance is to possess an odour that it shall be volatile. He also concludes that if the molecules are to reach the seat of the sensory power they must be miscible with, or soluble in, the fatty material lining the cone cells.

It is evident that, since to reach the fatty material the molecules have to pass through the layer of aqueous saliva, it is necessary either that they should be insoluble in water or that their partition coefficient, between water and the fatty material, should be such that a sufficient proportion shall pass into the fat. It is to be noted that there is a lower limit of concentration, the "threshold value," below which the odour of a substance cannot be detected; this value varies with the individual and may be related to the partition coefficient. The suggestion has been made that there is a second threshold value above which the scent of a substance appears different, because more concentrated.

To these criteria of volatility and preferential solubility in the fatty secretion, Dr. Dyson considers that a third should be added by virtue of which the molecules, having come into physical contact with the cone-like cells, shall be capable of exciting them. He cannot look to chemical constitution to provide the answer to this problem because there is but a very indirect relationship between chemical constitution and odour; widely differently constituted substances may have similar odours—as nitrobenzene and hydrocyanic acid—or substances having similar constitutions may have totally different odours. Dr. Dyson postulates for this excitation effect that there must be periodic vibration of some part of the molecule. He finds evidence for this in the Raman effect, apparently by reason of certain observations that substances having similar odours have similar Raman shifts.

As examples Dr. Dyson lists certain types of odours, the Raman shift being given in brackets: aldehydes and ketones (1,700); esters, terpenes and aldehydes (1,800); acyl chlorides (1,900); chlorinated aromatic hydrocarbons (2,300); mercaptans (2,500); aromatic hydrocarbons (3,000); amines (3,200); pyridine and pyrrole (3,300). Dr. Dyson adds a third condition for odour, namely, that the substance should possess a Raman shift between 1,500 and 3,400. The importance of this extension to the theory of odour is that it would allow a quantitative numerical expression for any odour. The suggestion yet remains in the realm of speculation, however, and some criticism was raised against this application of the Raman effect. It was pointed out, for example, that the Raman shift is altered, but the odour remains unchanged, if the normal hydrogen contained in an odorous substance is replaced by heavy hydrogen. No doubt the theory is as yet in its infancy and may be modified to take account of such criticisms as are valid.

Notes and Comments

Necessity for National Economy

THE croakers may say what they like, but this is a wonderful country. A fortnight before the end of the financial year the Budget account shows a surplus of £10,000,000 of ordinary revenue over ordinary expenditure. A year ago at the same time there was a deficit of £10,000,000. Accordingly, after a year of extraordinary commotion, with the prophets of gloom more woebegone than usual, the taxpayer has found it possible to show an improvement of £20,000,000 in his contribution to the national services. There can be nothing wrong with British trade if this is its outward manifestation. We wish we could feel the same confidence in the spenders of this money as in the raisers of it. The re-armament programme is a burden cheerfully accepted by the nation at large, but the continued growth of civil expenditure should cause the gravest concern to all who understand its implications. The inherent strength of Great Britain would be far more effective if the great effort for national security were accompanied by a renewed campaign for national economy.

Sir William Perkin's Centenary

LAST Saturday was the centenary of the birth of Sir William Perkin, the discoverer of the coal tar colours, and it is fitting that we should remind ourselves briefly of what we owe to his great work. He was less than twenty years of age when he produced the first coal tar colour, mauve, from aniline. The revolutionary nature of this achievement can be appreciated from the fact that before 1856, the date of the discovery, there were very few colours available and these were extremely crude and gave uncertain results in application. Perkin had the foresight to realise the great importance of this work, patented the process and commenced commercial production at Greenford in 1857. His works closed in 1874, owing to German supremacy in the coal-tar industry. It is bitter to think that this supremacy was not due to technical superiority, but rather to commercial development, Government encouragement, which were lacking in this country, and the ruthless exploitation of Perkin's patents. Perkin should also be remembered for the preparation of the first synthetic perfume, coumarin.

Amalgamation in the German Chemical Industry

A RENEWED wave of company amalgamation, generally involving the complete merger of subsidiary or affiliated concerns into the parent or controlling company, has occurred within the German chemical industry in recent months. The objects are, briefly, more effective managerial control, lower operating costs, and rationalisation of production with its concentration in most efficient plants. Potent factors which have promoted these mergers have been the increasing pressure for downward revision of domestic chemical prices exerted by the Government (for instance, the compulsory drastic reduction of fixed fertiliser prices by 25 to 30 per cent. in the spring of 1937), and the pressure of intensifying foreign competition. The new changes involve the disappearance of long-established and internationally well-known company names. The most important of the recent intra-group consolidations was that of the affiliated Salzdetfurth-Aschersleben-Westeregeln potash companies, controlling 25 per cent. of the entire German potash production and leading to a reduction of capital by 30 million R.M. The newly-organised company, in addition to enlarging its potash production capacity, proposes to construct a new plant for the manufacture of sulphuric acid from Kieserite in conjunction with the Hattorf plant in the Werra district, at an estimated cost of 25 million R.M., and a new plant for producing magnesia, needed as refractory, in replacement of imported magnesite. Another consolidation within the "family group" has been the complete legal merger of Schering-Kahlbam A.G., capitalised at 27.75 million marks, with its controlling company popularly known as "Oberkoks," capitalised at 48.3 million marks, and the separation of the coal-mining properties of the holding company ("Oberkoks") into a new concern. The resulting chemical combine has been named Shering A.G. A third merger is the complete absorption by Th. Goldschmidt A.G., Essen, capitalised at 16.5 million marks, of its part-subsidiary, Chemische Fabrik Buskan, Ammendorf, with a capital of 8.5 million marks. Finally, the well-known Wintershall A.G. has fused with the Mittel-deutsche Treibstoff und Oelwerke A.G., Kassel, specialising in motor fuel production.

Low Beet Sugar Output

FROM its earliest beginnings, the home beet sugar industry has encountered numerous economic difficulties in its path which have been surmounted mainly by Government subsidy. Although the amalgamation in 1936 of the fifteen beet sugar companies into one corporation, the British Sugar Corporation, Ltd., gave greatly increased efficiency in organisation and production, the output of home-grown sugar from last season's crop fell by more than 26 per cent., the total production of the factories being only 390,930 tons, compared with 537,370 tons in the previous year. This sharp decline was due in part to a fall in the average yield of beet per acre, but the deciding factor was the decrease, of more than 12 per cent., in the acreage devoted to the cultivation of beet. In order to meet the farmers' complaint that the fall in the productive area took place because beet was no longer a remunerative crop, the Sugar Commission raised the beet prices paid by the sugar factories by about 1s. 6d. per ton. At the same time, however, the Government subsidy appears to be falling off from year to year. In 1934-5, it was 4½ million pounds, in 1936-7 slightly over 3¼ millions, while in the budget estimates for the current year the subsidy is entered as 2¼ millions.

Works Management Association

THE Works Management Association, founded in 1931 as the British Works Management Association and incorporated as a limited company by guarantee in 1936, has among its objects to increase the productive efficiency of British industry by developing the technique of works management, to secure a wider recognition of the importance of efficient works management, and to improve the professional status of works managers. The full objects and certain other particulars of the association are described in a new booklet which has just been published. Of special interest is the training and examinations scheme which has now been inaugurated, although it is pointed out that membership of the association is not yet limited to those who pass these examinations. Several members of the chemical industry serve on the association's fully-representative council and district branch committees. It should be added that this body has no connection with the newly-formed Institution of Works Managers, preliminary details of which were given in our February 26 issue.

The Mechanism of Gaseous Chemical Reactions*

By
H. W. MELVILLE, D.Sc., Ph.D.

THE elucidation of the mechanism of gaseous chemical reactions by a study of the influence of various factors on the rate of reactions has now become one of the well defined branches of physical chemistry. The onset of this phase was due to the combination of a number of viewpoints and hence within the past decade the development has been exceedingly rapid.

Collisions between Activated Molecules

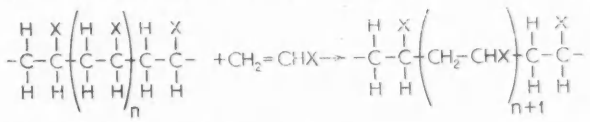
Almost at the foundation of physical chemistry it was realised by Arrhenius that the molecules which took part in chemical transformations were in a particularly energetic or activated state, the evidence for the hypothesis being that the rate of such reactions increased exponentially with temperature. At that time, however, the nature of the activated state could not be defined: it was not known whether the molecules were merely excited in the physical sense or whether they were unstable chemical modifications of normal molecules. Nor was it known what relationship existed between the absolute rate of a reaction and the energy possessed by the molecules in the activated state. The first advance was made when it was shown in bimolecular reactions that the rate of collisions between activated molecules wholly determined the rate of reaction. Deviations from this simple behaviour were soon discovered and likely explanations subsequently followed. For example, sometimes the molecules, especially of a complex character, could emerge from the activating collision and subsequently react, thus giving rise to unimolecular reactions. From similar exact studies on ternary reactions, it was found that in many examples the rate of collision of three normal molecules defined the absolute velocity of reaction. To these three types of process two additions must be made. In exothermic reactions, such as combustions, the products of the reaction possessing a large amount of energy, can transfer, by collision, that energy to normal molecules so that the supply of activated molecules is augmented. Alternatively, the propagation of reactivity may occur by means of atoms or radicals. This effect may often become so important that the occurrence of one primary reaction may induce reaction among thousands of molecules. In some gaseous oxidations, the nature of the above process is slightly modified in that occasionally one product molecule might activate *two* reactant molecules, when the chain is said to branch. (An example of the type of collision in the oxidation of phosphorus vapour is that between phosphorus oxide and oxygen molecules in which the latter molecule is dissociated to two atoms each of which start off a chain). The supply of activated molecules is so much increased that explosion occurs in the mixture. Moreover, the branching is very sensitive to small changes in pressure and temperature so that explosion only occurs within a well defined pressure and temperature region.

Study of Gas Phase Polymerisations

Most gaseous reactions are complex but fortunately they all consist of a number of simultaneous or consecutive reactions involving collisions of the types mentioned above. In principle there is no difficulty then, in isolating by kinetic technique the various reactions and so constructing a mechanism for the whole reaction. In fact this has been one of the lines upon which much development has taken place. A more recent phase is the application of kinetic technique to the synthesis of large molecules. Here the problems are somewhat different from those involved in normal gas phase reactions, because hardly anything is known about the reactivity of really large molecules.

* Based by the author on a series of three lectures delivered by him at the Royal Institution.

While the examination of the structure of large molecules has revealed much about the manner in which the units are linked together it is evident that this information provides only half the story, the mode and conditions of growth of a polymer supplying the other half. Unfortunately suitable gas phase polymerisations are limited to a comparatively small number of molecules—mostly derivatives of ethylene. Such polymerisations do not occur spontaneously and must therefore be started photochemically. The curious fact about ethylene derivatives is the very marked effect of the nature and position of substituents. For example, all molecules of the general type $CH_2 = CHX$, where X corresponds to Cl, Br, $COOCH_3$, CN, $CH = CH_2$, readily polymerise when illuminated with light of suitable wavelength. Similarly, compounds of the type $CH_2 = CXY$, where X and Y may or may not be different, polymerise. If, however, the structure is modified to $CHX=CHY$, polymerisation is stopped altogether. In so far as photochemical starting is concerned the X group certainly acts as a chromophore, subsequently passing on its energy to excite the electrons of the double bond, for if ethylene itself is illuminated at 2,000 A (that is, absorption by the double bond) the molecule is decomposed to acetylene and hydrogen. On the other hand if light of too short a wavelength is employed with the substituted ethyienes a similar decomposition unaccompanied by polymerisation ensues. One of the fundamental problems in such ethylene polymerisations is to discover in any given reaction whether growth occurs by the so-called free radical mechanism:—



or by the double bond mechanism:—

$$CH_3.CHX(CH_2.CHX)_nCH=CHX + CH_2=CHX \rightarrow CH_3CHX(CH_2CHX)_{n+1}CH=CHX$$

Discrimination between Free Radical and Double Bond Mechanisms

One method of discriminating between the two is to make sure that the free radical mechanism will operate by adding photochemically hydrogen atoms or methyl radicals which immediately react with $CH_2 = CHX$ to give $CH_3 - CHX -$. The kinetics of this free radical growth are then compared with those of the normal polymerisation. If they are similar the normal reaction is of the free radical type, if significantly different, the double bond mechanism is operative. This can be accomplished with methyl methacrylate $CH_2=C(CH)_3COOCH_3$. When induced to polymerise with H atoms the reaction occurs wholly in the gas phase at a rate proportional to the square root of the light intensity, each polymer molecule taking some 10^{-2} sec. to grow. The normal polymerisation starts in the gas phase, but the most remarkable fact is that it continues on the walls apparently indefinitely after the light is cut off, that is, the rate of growth is independent of intensity. This latter polymerisation must therefore be of the double bond type. Such protracted growth in the dark is unique in polymerisation reactions, the only other example being chloroprene $CH_2 = C(Cl)CH = CH_2$. This continuous growth appears to be exhibited only by $CH_2 = CXY$ compounds, for if methyl acrylate and vinyl chloride are examined in a precisely identical manner it is found that neither molecule grows for any appreciable time after the light is cut off. The long life of the polymer is thus apparently due to a second substituent on the α – carbon atom.

Molecular weights of polymers may be determined by the kinetic technique, thus providing a supplementary method to those at present in use. First of all it is necessary to deter-

mine how many polymer chains are started for each quantum absorbed by the monomeric vapour (α). This is done by adding an inhibitor to the reaction mixture such that each polymer chain is stopped by one molecule of the inhibitor. The ratio of the number of molecules polymerised to the number of inhibitor moleculues used up is the chain length (L) of the polymer. The number of quanta absorbed is also measured so that the quantum yield (γ) of the reaction is known, therefore $\alpha = L/\gamma$. Hence in the normal reaction, the molecular weight of the polymer (monomer molecular weight M) is simply $\alpha\gamma M$.

Some problems in kinetics are insoluble with the customary technique and would have remained unsolved had it not been for the isolation of appreciable quantities of the isotopes of the common elements which can be employed as indicators in chemical reactions. Of the lighter elements, the isotopes of hydrogen, nitrogen and oxygen have already proved of immense benefit in this connection, for their concentrations can usually be determined by simple physical methods. With heavier elements such methods are inapplicable, but fortunately use can now be made of radioactive isotopes of phosphorus, chlorine, bromine and iodine.

For example, it has been shown by hydrolysing amyl acetate with heavy oxygen water H_2O^{18} that the bond broken on hydrolysis is between the OC_5H_{11} group and the carbon atom of the carboxyl group, since the heavy oxygen is found in the acetic acid. In homogeneous and heterogeneous gas reactions involving hydrogen, deuterium has solved numerous problems. For instance, in photochemistry it is sometimes difficult to explain why the quantum yield (γ) of an apparently simple decomposition reaction is less than unity, as occurs with ammonia where $\gamma = 0.25$ and where it is known that the molecule is certainly decomposed, immediately the light is absorbed, to an NH_2 radical and an H atom. It was suspected that γ was low on account of the subsequent recombination reaction $NH_2 + H \rightarrow NH_3$. This was supported by the fact that hydrogen atoms inhibited the photo decomposition and was proved by using deuterium atoms when the ammonia becomes "heavy." In heterogeneous reactions involving hydrogen the question at once arises: is the hydrogen dissociated to atoms on the catalyst and if so is this the rate determining step? The rate of dissociation to atoms can easily be followed by allowing a mixture of H_2 and D_2 to come into contact with the catalyst, when the rate of formation of HD molecules at once gives the rate of dissociation of hydrogen. When such measurements are carried out in presence and in absence of the other reactant it can soon be discovered whether or not that reactant has any effect in displacing hydrogen from the surface. In general the rate of dissociation of hydrogen is not the rate determining step. This happens with the exchange reaction $CH_4 + D_2 \rightarrow CH_3D + HD$. Here the rate determining step is the dissociation of CH_4 to CH_3 and H, for when a mixture of CH_4 and CD_4 is brought into contact with the nickel catalyst, the rate of formation of the intermediate methanes CH_3D, CH_2D_2, CHD_3 is of the same order as that of the exchange reaction itself.

New I.C.I. Dyestuffs

Additions to the Colour Ranges for Wool, Cotton, Acetate Rayon, and Leather

AN entirely new range of acid milling dyes for wool has been introduced by the Dyestuffs Group of Imperial Chemical Industries, Ltd., under the name of "Carbolan." These new dyestuffs offer a combination of useful properties formerly unobtainable with acid dyestuffs on wool, combining exceptional brightness with excellent all-round fastness properties. With the chrome dyestuffs, fastness to light and milling is in general offset by dullness of shade, whilst with the brilliant dyes formerly available, milling fastness was often retained at the expense of light fastness.

CARBOLAN YELLOW 3 GS, CARBOLAN CRIMSON BS, CARBOLAN VIOLET 2 RS and CARBOLAN BLUES BS and RS all have excellent affinity for the wool fibre from neutral or slightly acid dyebaths, and may be applied in the various types of circulating machines and in the open beck. The shades produced have excellent fastness to washing, perspiration, salt water and the various finishing processes. These excellent all-round fastness properties make them of great value both in self shades and as components for mode shades, as well as for the dyeing of loose wool for tweeds, slubbing for fancy worsteds, hosiery knitting and bathing costume yarns and yarns for blanket headings. They are also of value for the dyeing of weighted and unweighted silk from neutral or slightly acid dyebaths, and for producing solid shades on wool-silk union mixtures.

The "Carbolan" range can be used in conjunction with chrome dyestuffs, particularly in the chromate process, since the shades are but little affected by chrome in the dyebath.

MONASTRAL FAST GREEN GS is a new addition to the I.C.I. range of pigment dyestuffs. Like Monastral Fast Blue BS, it possesses outstanding brilliance, high tinctorial power and general fastness properties. A homogenous green pigment dyestuff, it has definite advantages over greens composed of mixtures of blues and yellows. It is available in paste and powder form.

Two new additions have recently been made to the range of Durazol dyestuffs. DURAZOL FAST BLUE RUBINE BS is one of the fastest to light direct cotton dyestuffs available. DURAZOL FAST VIOLET BS, a direct cotton dyestuff with very good fastness to light, possesses excellent level dyeing properties and is of special interest for the production of pale lilac and pastel colours. Since the exhausting properties of these new dyestuffs are relatively slow, they are strongly recommended for warp and jig dyeing; they are also suitable for padding purposes.

DURANOL BLUE 2 GS PASTE, a new addition to the range of acetate rayon dyestuffs, produces a greenish blue of excellent fastness on acetate rayon and is of value for the production of pale and medium shades where a high degree of fastness to washing and perspiration is required.

SOLOCHROME FLAVINE GS, a new addition to the chrome mordant dyestuffs, is specially suitable for application in circulating machines and its excellent fastness properties render it of great value both as a component for mode shades and self shades and for the dyeing of loose wool for suitings and overcoatings, and slubbing for fancy worsteds, hosiery, knitting and bathing suit yarns. Applied to silk by the after-chrome process it gives a greenish yellow shade of excellent fastness to washing and degumming.

NAPHTHALENE LEATHER BROWN TNS is a new homogenous acid dyestuff specially prepared for application to leather. It gives tan shades of good all round fastness and should be of general interest to the leather trade.

CHLORAZOL DIAZO ORANGE 3 GS is an addition to the range of diazotisable direct cotton dyestuffs. Its chief assets are its excellent working properties, its high standard of fastness to light, washing and perspiration and its value for dischargeable ground shades. It is of interest for the dyeing of orange shades of very good fastness to light and washing on cotton and viscose rayon tubular knitted fabrics on the winch machine; yarns for knitted fabrics and sewing cottons, and for the dyeing of loose cotton.

Another Useful Reaction of Formaldehyde

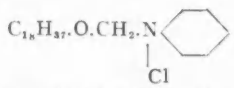
Some New Products for Textile Finishing

THE discovery of the biological importance of formaldehyde in the synthesis of natural plant substances, sugars, etc., as shown by Baly, has its counterpart in versatile utility of the same substance in scientific and industrial synthesis. The interaction of formaldehyde and an aromatic alcohol, or a phenol, is known to produce a resinous substance of unknown composition. It is, therefore, logical to ask, what is the effect of bringing together an *aliphatic* alcohol and formaldehyde? Presumably resinous products may be obtained in this way: it is known, however, that under certain conditions an ether is formed. Thus, a fatty alcohol, formaldehyde and hydrochloric acid may be caused to give a halogen ether, $CH_3.(CH_2)_n.O.CH_2Cl$. The latter may then be caused to react with, for example, a thiosulphate to give a product which is useful for wetting, washing, emulsifying, dispersing, peptizing, and for promoting foam production and level dyeing. The same halogen ether forms quaternary compounds with tertiary amines, and these latter compounds have wetting and dispersive qualities. The reaction with thiosulphate is, of course, an exchange of chlorine for thiosulphate radical, whereas with tertiary amines addition takes place.

Example of Fatty Alcohol-Formaldehyde Reaction

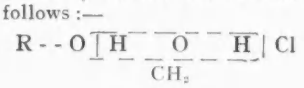
Let us study the reaction between fatty alcohol and formaldehyde more fully. 270.4 parts by weight of octadecyl alcohol are dissolved in benzene and 30 parts of trioxymethylene are added. Dry hydrogen chloride is now passed in, with cooling so that a temperature of 5 to 10° C. prevails. Ultimately the gas ceases to be absorbed, which indicates the completion of the reaction. The aqueous layer which forms above the benzene is next removed and the hydrocarbon distilled off. The residue is now fractionally distilled at a pressure of about 3 mm., when the octadecyl chlormethyl ether ($C_{18}H_{37}.O.CH_2.Cl$) passes over about 200° C. The patentees of the above process state that the reaction proceeds smoothly and that comparatively high yields of product, 80 to 100 per cent. are obtained.

The conversion of the above ether compound to a quaternary salt is stated to be equally easy and satisfactory. Thus, 319 parts of the above may be mixed with 101 parts of triethylamine to give a water soluble product which is a good wetting agent. The tertiary nitrogen atom may be part of a heterocyclic ring system, for example, pyridine, giving octadecoxy pyridinium chloride:



This substance and its variants, as obtained by using other fatty alcohols and other heterocyclic compound bases, has been stated to have a number of useful qualities. First as a wetting agent, and again as an auxiliary to increase the fastness of dyeings on cotton and cellulosic fibres. In one patented method, 10 kilos of viscose rayon dyed with Chlorantine Red 8BN in the usual manner, is treated with 100 grams of cetyloxymethyl pyridinium chloride in 200 litres of water. The textile is then centrifuged and dried, when it is found that the fastness of the shade to water is materially improved.

It is not always scientifically sound to represent reactions on paper diagrammatically, but in the present case an attempt may not be without general interest. If R – OH represents an aliphatic alcohol, the reaction with formaldehyde and hydrochloric acid, with the elimination of water, may take place as follows:—



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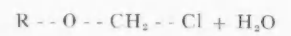
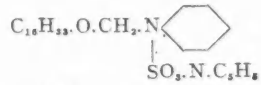


The foregoing process of preparing a quaternary ether consists of two distinct steps, first the formation of halogen ether, and then the condensation of the latter with pyridine or other nitrogen base. More recently, it has been found possible to effect the preparation in one single process, an obvious advantage.

Preparation of a Quaternary Ether in One Step

According to B.P. 475,119, 30 parts of cetyl alcohol, 120 parts of pyridine and 12 parts by weight of paraformaldehyde are heated together under reflux at 90° to 100° C., whilst sulphur dioxide is passed in. The process is discontinued when a sample of the mixture is found to be readily soluble in water to give a clear solution (10 minutes is an average). The uncombined formaldehyde and pyridine are then distilled off from the mix by heating under reduced pressure to 60°-70°. The residue is a pale viscous substance which is readily soluble in water, and analysis shows it to be either the pyridine sulphite or pyrosulphite of cetoxymethyl pyridinium:—



There is a strong similarity between the two ether quaternaries so far described; both contain a fatty alcohol residue. It is interesting then to know that similar derivatives of short-chain aliphatic alcohols may be made by the method just described. 3.2 parts methyl alcohol, 64 parts pyridine and 8 parts by weight of paraformaldehyde are heated together at 80° with SO_2 passing through. After a short time no external heating is required and the mixture may be maintained at this temperature without. When the gas ceases to cause the temperature to tend to rise, the mixture is cooled. Two layers separate, and the lower one is taken and washed with acetone, ether and is then dried in vacuo at 30° C. The resulting methyloxymethyl pyridinium pyridine sulphite (and pyrosulphite) is a slightly pink oil which dissolves readily in water. The formula is of a similar type to the foregoing, except that the methyl group takes the place of the fatty alcohol radical.

Application of the Quaternaries in Textile Finishing

There is, of course, a definite scientific value in the discovery of such methods, but the products have also been found of great practical utility in the finishing of textile materials of all denominations. Some of the quaternaries described have been known to manufacturers of textile auxiliaries for a few years, but comparatively recently a discovery was made which puts a new value on them all. It is that textile fabrics impregnated with a solution of many of these compounds, dried, and then "baked" at a higher temperature, undergo an interesting and unexpected change in physical properties. They become softer, and more important; they become water-repellent. Here is an entirely new approach to the water-proofing of textiles. It promises to supersede many of the older methods of conferring water-resistance, for instance, by the use of metallic soaps, although of this one can only surmise. The particularly attractive feature of the process is that the water-repellent finish is a permanent one, and is not lost by washing or dry-cleaning the fabric. Innumerable useful applications of the discovery in the textile industry may be visualised.

Details of the treatment of a cotton fabric with a quaternary ether compound are to be found in B.P. 469,476. Octadecoxymethyl pyridinium chloride, 1 part, is dissolved in 146 parts of trichlorethylene at 33° C. A cotton fabric is immersed in such a solution, is squeezed, and dried in moving air at 30° C.

Following this, it is baked for 30 minutes at 105° C. In the latter stage, some decomposition of the pyridinium compound takes place and the residue combines in some way with the fibre substance and changes its physical attributes permanently. The fabric so treated is found to be of soft handle and to be strongly water-repellent. No impairment of tensile strength is produced. The method so described deals with cotton, but wool and other fibrous materials may be subjected to the same transformation.

Whilst this water-repellent proofing is a style of finishing in itself, the same principles may be combined with other known processes, as for example dressing with starch, when a finish of a water-resistant, permanent nature is obtained. According to one recent patent methyloxymethyl pyridinium salts, *e.g.*, sulphite, may be used for this process, whose preparation was described earlier. Thus, cotton sheeting is treated with a 1-in-9 corn starch paste at 100° C., and after squeezing and drying is padded with a 1 per cent. aqueous solution of methyloxymethyl pyridinium chloride. Following this, the material is dried at low temperature and then baked at 105° C. for 30 minutes. The finish obtained is smooth, and is resistant to laundering treatment.

Paint Materials

Publication of Revised British Standards

THAT the revision of the series of British standards for paint materials is being actively pursued is evidenced by the issue of three further publications (B.S.S. No. 255, Extenders for Paints, B.S.S. No. 331, Driers for Paints, B.S.S. No. 370, Venetian Red for Paints).

The publication for extenders includes four separate specifications for asbestine, barytes, blanc fixe and silica, and that for driers has specifications for both paste and liquid driers. These specifications have been grouped together in accordance with the policy of combining similar specifications in the hope that they will be more serviceable to industry in this form. Proposals for amendment to the specifications have been more carefully considered and where it was considered desirable they have been modified.

Principal Technical Alterations

The following are the principal technical alterations :—

Extenders.

B.S. No. 255. Asbestine. Description :—Provision is made for microscopical examination of particle shape and size.

B.S. No. 260. Barytes. Description :—Provision is made for microscopical examination of particle shape and size. Oil absorption :—The limits are now 8 and 12 (previously 9 and 14). Volatile matter :—The max. limit is now 0.5 per cent. (previously 0.75 per cent.). Coarse particles :—A residue on a 240-mesh B.S. Sieve of 0.25 per cent. is now permissible (previously all the material had to pass through).

B.S. No. 281. Blanc fixe. Description :—Provision is made for microscopical examination of particle shape and size. Composition :—The minimum barium sulphate content is now 96 per cent. (previously 98 per cent.) with an additional statement that the total barium compounds shall not be less than 98 per cent. Coarse particles :—A residue on a 240-mesh B.S. Sieve of 0.1 per cent. is now permissible (previously all the material had to pass through). Carbonates :—An additional requirement has been included that the total carbonates present shall not exceed the equivalent of 0.1 per cent. of carbon dioxide.

B.S No. 301. Silica. Description :—Provision is made for microscopical examination of particle shape and size.

Driers.

B.S. No. 331. Paste driers. Oil content :—The allowance for unextracted oil is now 0.5 per cent. (previously 0.3 per cent.).

B.S. No. 332. Liquid driers. Volatile content :—The maximum limit is now 80 per cent. (previously 78 per cent.). The lower limit has been deleted.

No technical modifications have been made to the specification for Venetian Red. In all cases, however, the opportunity has been taken to secure uniformity of wording and clarity of expression in the clauses of the specifications and the appendices.

Copies of these revised British standards can be obtained from the Publications Department, British Standards Institution, 28 Victoria Street, London, S.W.1, price Nos. 255, 260, and 281 (in one vol.) 3s. 8d. post free; Nos. 331 and 332 (in one vol.) 2s. 2d. post free; and No. 370, 2s. 2d. post free.

Diacetyl Content of Butter

A New Testing Method

THE testing of butter for its diacetyl content is a problem which is particularly important in France, because the addition of this substance to butter and cream is forbidden. Mr. Pien, chief chemist of the Fermiers Reunis Co., one of the largest French dairies, has now worked out a system for testing of this substance for use in the control of supplies of butter and cream passing through their hands.

The new method is based on the fact that a ketone group can be condensed with an amino group of another molecule to eliminate the hydrogen and the oxygen from the cule. In the case of diketones, such as diacetyl, each of the two CO groups can partake in this reaction. This led to considering the possibility of condensing diacetyl with an aromatic orthodiamine. As the orthophenylenediamines are not usually to be bought, however, it was necessary to use a toluene diamine—metaparatoluilenediamine—which is easy to prepare.

The test is carried out with a 2 lb. sample of butter or cream, enclosed in a 2-quart glass vessel. This is placed in a vessel of hot water and a current of steam is passed over the surface of the sample. The steam is easily able to carry off the diacetyl which may exist in the sample. Two samples of the steam condensate, each of 50 cc. are collected, and each of these is then separately distilled to give 10 cc. of distillate. This is placed in a test tube and 0.5 cc. of a 1 per cent. solution of metaparatoluilenediamine is added. Then 10 cc. of concentrated sulphuric acid is carefully run in by means of a pipette. As the diamine acts on the diacetyl, a yellow colouring is produced by the formation of quinoxaline. The reaction requires about an hour to complete, when the yellow colouration will have reached its maximum. The colour will be visible for traces of diacetyl of not more than 1 in 100,000.

In order to determine the amount of diacetyl in the solution its colour may be compared with a solution of known diacetyl content which has been similarly treated. As this method is long and cumbersome use is made of solutions of bichromate of potassium of known concentration and a table has been worked out to give the equivalents of the two solutions. For this purpose he uses a standard solution of 1 per cent. of the bichromate, which is diluted with water up to 200 cc. The equivalents are as follows :

per cent. of diacetyl	0.1	0.05	0.02	0.010	0.005
cc. of $K_2Cr_2O_7$ in 200 cc.	6.7	5.0	3.0	1.9	1.0

For solutions containing a higher percentage of quinoxaline, it is preferable to dilute the solution, rather than use a stronger bichromate solution.

SOAP manufacture from coal will shortly be carried out on a considerable scale in Germany now that the yield of paraffin was has been increased from 8 to 50 per cent. by the low-pressure coal hydrogenation process. In addition to the existing trial plant at Witten (Ruhr), two new plants are in course of erection, bringing up the total annual production capacity for synthetic fatty acids to 60,000 tons.

The Micrography of Paint Films*

By
A. D. WHITEHEAD

THE paint works laboratory is frequently called upon to give information regarding the structure and composition of paint films as applied to surfaces and the present work has been carried out to facilitate such investigations and to place the chemist in a position to give authoritative rulings in such cases.

Preparation of Transverse Sections

In order to trace the complete history of a detached or blistered paint film it is essential that a transverse section be prepared in such a manner that it can be viewed under the microscope. By this method it is possible to ascertain the number of coats constituting the film and by a series of reactions the observer can identify the most common pigments in the various layers. According to the state of the film, whether it be fairly tough or in a somewhat friable state the method of obtaining the required transverse section must be made. In the case of well bound films, it is usually satisfactory to embed them in paraffin or Japan wax and cut very thin sections, as thin as 3 mu., in the microtome. In other cases film is embedded in a molten mixture of I.G. Wax O and Synthetic Resin A.W.2. Such a mixture has a low melting point, is low in acid value and does not crack or shrink unduly when cooled.

The film, having been fixed in a block of the above mixture and cooled, is then ground smooth on a file and finished to a polish on a fine Arkansas oil stone, using soap solution and a little alcohol as a lubricant. With care, this gives a very satisfactory transverse section for viewing, and it is usually possible to count the number of coats making up the film. Difficulty may arise where two coats of the same material have been applied immediately over each other, but it is usual to get some indication from the thickness of the layer.

The common white pigments can now be tested for by applying a number of well defined tests. If the film be treated with a drop of 10 per cent. potassium chromate, then, any films containing a lead pigment, which is not combined with a second reactive pigment such as zinc oxide, will be stained yellow. Following this, a treatment with H_2S has the result of producing a brown to black stain on *all* lead containing film, while those containing antimony assume a yellow to orange stain if the treatment is sufficiently prolonged. In order of procedure, the surface is next ground away, and a new transverse section exhibited for treatment. In order to distinguish between white lead and basic lead sulphate, advantage is taken of the fact that the former adsorbs nethylene blue from .001 per cent. solution while basic sulphate is unattacked. From this point onwards, the specimen is ground and repolished between each operation.

Detecting Zinc Oxide

To establish the presence of zinc oxide, the following test is applied. A reagent consisting of a saturated solution of alizarine in 2 parts alcohol and 1 of water, the whole being made 2N in acetic acid, is applied to the surface. The presence of zinc oxide is clearly indicated by the production of a bright red stain, this stain not appearing in the case of lithopone. This latter, however, will react to give a deposit of brown bismuth sulphide if treatment is carried out with 1 per cent. bismuth chloride in 2N HCl. The time taken for this reaction is about 30 minutes. The presence of antimony which has been noted from the H_2S test can be confirmed by a test due to Emich. In this, 1 drop of .5 N HCl is applied to the specimen. On one side of the drop is placed a small crystal of KI and on the other a few fragments of caesium chloride are added. Solution is immediate, and where the two solutions intermingle, a bright scarlet coloration is deposited on the antimony containing films. Any shade other than scarlet is ignored.

A test described by Clark for antimony curiously enough appears to be specific for titanium in this particular technique. The reagent, which must be freshly prepared for each test, is prepared in the following manner: To about 1 cc of 2N HCl is added a crystal of potassium iodide, the size of a split pea, and a few grains of phenezone (anti-pyrene). The concentrations are not critical. A drop of this reagent is applied to the specimen, which is then covered with a microbelljar (cut down test tube) and is left for about 30 minutes. The temperature of the laboratory should not be below 65° C. for this test to be satisfactory, or alternatively, the specimen may be stood in a warm place, such as near the radiator, hot plate, etc. At the end of the period stated titanium films are stained an orange brown. Pale yellow stains are neglected, or in cases of doubt may be bleached out by a few seconds treatment with a dilute solution of sodium thiosulphate.

The white pigments in tinted paints may frequently be detected by the above methods, due allowance being made for the stain colour being modified by the self colour of the film. Prussian blue may be distinguihed from ultramarine in that it is bleached by caustic soda solution and is blackened by H_2S.

The use of incident ultra-violet light in most cases yields very little information, but occasionally indications are afforded which would not readily be available by any other known method.

* Abstract of a paper read before the Manchester Section of the Oil and Colour Chemists' Association on March 11.

Magnesium Oxychloride Flooring Compositions

B.S. Specification for Materials Used in Manufacture

AS a result of inquiries which were made to the Building Research Station with regard to difficulties which were being experienced with oxychloride flooring compositions, a conference of manufacturers was convened some four years ago to consider what steps might be taken to ensure satisfactory flooring of this type. One of the outcomes was a request to the British Standards Institution for the preparation of British standards to cover the various materials used in making magnesium oxychloride flooring compositions. A committee was accordingly set up to carry out this work and the issue of the publication (B.S.S. No. 776-1938) is the result of their work.

This publication includes separate specifications for calcined magnesite, magnesium chloride, fillers such as wood flour, sawdust, ground silica, etc., and pigments. Owing to the absence of sufficient information, many of the requirements relating to the testing of calcined magnesite have been left open to be the subject of agreement between purchaser and manufacturer. At a subsequent revision it is hoped to include appropriate values. There are a number of appendices which describe in detail the methods by which the various tests have to be made. The publication will prove of great value to all those interested in this type of flooring and will, it is hoped, materially assist in the industry in securing a reliable standard.

Copies of this British Standard, B.S.S. No. 776, can be obtained from the Publications Department, British Standards Institution, 28 Victoria Street, London, S.W.1, price 2s., or 2s. 2d. post free.

THE CELLULOSEFABRIEK A.G. has been founded at Humene by a Swiss financial group, with a capital of 8 million kronen. It will specialise in the production of cellulose for the rayon industry.

Society of Public Analysts

Annual Meeting and Dinner

AN ordinary meeting of the Society of Public Analysts, followed by the annual general meeting, was held at the Institute of Chemistry, on March 4, the president, Dr. G. Roche Lynch, being in the chair.

Certificates were read in favour of the following candidates for membership: Ruth Bennett, B.Sc., G. J. Budds, J. G. A. Griffiths, B.A., Ph.D., A.I.C., W. J. C. Horne, J. E. Ritchie, M.A., B.Sc., F.I.C., M. J. Robb, B.Sc., F.I.C., and G. H. Turner, B.Sc., F.I.C.

The following were elected members of the Society: E. B. Ashcraft (U.S.A.), B.S., M.S., Ph.D., A. E. Cross, F. R. Ennos, B.A., B.Sc., F.I.C., R. L. Lord, M.Sc., M. G. De Navarre (U.S.A.), Ph.C., B.S., F. A. Robinson, M.Sc., A.I.C., W. H. Smith, S. R. Thompson, and C. E. Waterhouse, A.I.C.

The hon. treasurer, Dr. E. B. Hughes, presented the accounts for the year, showing a very sound financial position. The hon. secretary, Mr. L. Eynon, presented the report of the council, which showed a present membership of 831, 43 more than last year and 250 more than ten years ago. In his presidential address Dr. G. Roche Lynch referred with satisfaction to the growing membership of the society and to the steady growth in size and circulation of *The Analyst*, which, under the able editorship of Dr. C. A. Mitchell, had now become an important financial asset of the society. After some advice to young chemists, on the writing and reading of papers, he passed to the main subject of his address, "The Toxicology of the Narcotic Drug," with which he included observations regarding the barbiturates, thio-barbiturates, straight-chain ureides and morphine.

Election of Officers for 1938-39

The following were elected as Officers and Council for the year 1938-9:—President: Professor W. H. Roberts, M.Sc., F.I.C. Past-Presidents serving on the Council: F. W. F. Arnaud, E. Richards Bolton, J. T. Dunn, Bernard Dyer, John Evans, Edward Hinks, G. Roche Lynch, G. Rudd Thompson. Vice-Presidents: B. S. Evans, J. R. Nicholls, W. H. Simmons, T. P. Hilditch (chairman, North of England Section), J. F. Tocher (chairman, Scottish Section). Hon. Treasurer: E. B. Hughes. Hon. Secretary: Lewis Eynon. Other members of Council: E. B. Anderson, E. A. M. Bradford, W. G. Carey, R. C. Chirnside, S. Dixon, F. W. Edwards, S. Elliott, P. van B. Gilmour, H. E. Monk, J. G. Sherratt, F. G. H. Tate, E. Voelcker, J. B. McKean (hon. secretary, Scottish section), J. R. Stubbs (hon. secretary, North of England section).

The anniversary dinner of the Society, commemorating the 64th year of its foundation, was held at the Royal Palace Hotel. The members and guests, who numbered 150, were received by the president, Dr. G. Roche Lynch, and Miss Roche Lynch. The guests included Sir Robert H. Pickard, F.R.S. (vice-chancellor, London University, and president, Institute of Chemistry), Professor F. G. Donnan, F.R.S. (president, Chemical Society), Dr. Wm. Cullen (president, Institution of Chemical Engineers), Sir William Willcox, F.I.C., Mr. R. B. Pilcher (registrar, Institute of Chemistry), Mr. H. N. Linstead, secretary, Pharmaceutical Society), Dr. R. H. Slater, F.I.C., and Mr. F. A. Greene, M.I.Chem.E.

The President expressed the pleasure of the members in having with them that evening Dr. Bernard Dyer, one of the original members, who still participated actively in the business of the Society.

Sir Robert Pickard, president of the Institute of Chemistry, expressed his satisfaction in noting that all the past-presidents of the Society had been members of the Institute, as were also at present, with two exceptions, all the public analysts in Great Britain, Northern Ireland and, he believed, Eire. He thanked the Society for having elected him an honorary member.

Exposure of Wool to Light

Changes Affecting Level Dyeing

THE action of light on wool, with special reference to the dyeing of sheepkins and furs, was discussed by Dr. J. B. Speakman at a meeting of the British Section of the International Society of Leather Trades' Chemists, held at Leeds University, on March 5, the President of the Section, Dr. R. H. Marriott being in the chair. He described chemical and physical changes and their bearing on the difficulty of realising level dyeings with fibres which had been exposed to light over a part of their length. The work was undertaken at the request of Imperial Chemical Industries, Ltd. (Dyestuffs Group) and was directed jointly by Dr. Speakman and Professor F. M. Rowe, of the Colour Chemistry Laboratory, Leeds University.

It was found that breakdown of the cystine linkages in the fibre under the action of light and air leads to loss of surface scales and permits increased swelling of the damaged parts of the fibres. As a result, the exposed parts of staples dye more deeply than unexposed with colloidal dyes, and less deeply with crystalline dyes. So far as acid dyes are concerned, the defect can be corrected by modifying the degree of dispersion of the dyes in the dyebath, using aggregating agents with crystalloidal dyes and auxiliary products with colloidal dyes.

Level acid dyeing, however, often becomes unlevel during subsequent chroming, owing to the development of different hues on exposed and unexposed parts of the fibres. This further defect is due to the presence of excess sulphydryl and aldehyde groups in exposed wool, developed from cystine linkages by the action of light. The presence of this excess of reducing groups in exposed wool causes more complete reduction of the chromium deposited in exposed wool than of that deposited in unexposed wool, and the different states of the chromium in the two kinds of wool is responsible for the differences in hue. This defect can be corrected by pretreating wool with a particular basic chromium acetate in acetic acid solution. The chromium acetate minimises the excessive reducing power of exposed wool by combining with the sulphydryl groups, thus preventing the development of different hues on exposed and unexposed wools when acid dyes are afterchromed. In addition, it forms new linkages between the peptide chains of the wool in place of those broken by exposure, thus minimising the excessive swelling properties of exposed wool. The chromium acetate pretreatment process thus promotes level acid dyeings and diminishes the need for using aggregating or auxiliary products in the dyebath.

New Director of Benn Bros., Ltd.

Election of Mr. Norman French

ON several occasions in the past vacancies on the Board of Benn Brothers, Limited, the proprietors of THE CHEMICAL AGE, have been filled by the election of members of the editorial or managerial staffs. This precedent has again been followed by the election this week as a Director of Mr. Norman French, the editor of *The Timber Trades Journal*. This is the second editorial chair in Bouverie House which Mr. French has filled, as he was editor of *The Hardware Trade Journal* from 1925 to 1932. Sir Ernest Benn in moving his election read a very interesting profession of faith which Mr. French set down in the letter in which he applied for an appointment just after the Armistice in 1918. He then wrote: "I believe in trade journalism—in its value, its prospects and its soundness. Trade journalism of the future will be immensely more powerful, more valuable to the trade of the Empire and more profitable for the men engaged in it, than it has been in the past." This pre-vision was being shown by a man then actually in the trenches. His colleagues are happy to think that the ambition he then formed to have "a controlling position in trade journalism" has now been realised.

New Technical Books

A Text-book of Qualitative Chemical Analysis. By Arthur I. Vogel. Pp. 383. London: Longmans, Green and Co. 7s. 6d.

This book provides a complete text of qualitative chemical analysis. It is written along modern lines and contains all that the student is likely to require on the practical side, as well as a detailed theoretical treatment of the subject. A scheme of work for elementary students is given. Important sections are devoted to the particular requirements of the beginner, but the book contains all that a student would need from school certificate or matriculation to the time of taking his honours degree. It opens with a long chapter entitled "The Theoretical Basis of Qualitative Analysis," in which most of the theoretical principles which find application in the science are discussed. This is followed by a short chapter on analytical operations. Chapter III is devoted to the reactions of the cations, in the order of the groups, and a simple separation table is given following the reactions of the cations of each group; this is intended for the elementary student, and its purpose is to introduce him immediately to the practical applications of the reactions that he has studied. Chapter IV contains a systematic account of the most important reactions of the anions. Chapter V is concerned with the systematic qualitative analysis of inorganic substances, alternative procedures being given in a number of cases. Modifications of the analysis in the presence of interfering substances are fully dealt with in Chapter VI.

Physical Chemistry. By J. N. Brönsted. Translated from the Danish Edition (1936) by R. P Bell. Pp. 390. London: William Heinemann, Ltd. 12s. 6d.

This book is a translation of the author's "Laerebog i fysisk Kemi," which was published in 1936, and now forms the basis for instruction in physical chemistry at Copenhagen University and the Danish Technical College. Special emphasis is laid on the thermodynamic foundation of physico-chemical laws. In dealing with the basis of the laws of thermodynamics, the method of presentation differs considerably from that commonly employed. The types of work corresponding to the different forms of energy are introduced at the beginning of the treatment, entropy appearing in a simple manner as the extensive factor of thermal work. This method of treatment leads to a modified conception of the relation between heat and work. In addition to the thermodynamic aspect the subject-matter is also dealt with from the point of view of kinetic and molecular theory, partly in separate sections and partly interpolated in the thermodynamic treatment. Physical theories of atomic structure and the energy relations of atoms and molecules are included to a limited extent. The chemistry of strong electrolytes is developed on the basis of the theory of complete dissociation, while the section on weak electrolytes deals chiefly with protolysis and protolytic equilibria. There is a short section on capillary and colloid chemistry, in which the behaviour of surfaces and colloidal solutions is dealt with mainly from a thermodynamic point of view.

The Chemistry of Synthetic Surface Coatings. By Dr. Wm. Krumbhaar. Pp. 200. New York: Reinhold Publishing Corporation. London: Chapman and Hall, Ltd. 20s.

The vitally important problems of chemical reactions in the varnish kettle, and of surface chemistry of pigments and paints, are discussed in this book from a fundamental point of view. Drier chemistry and the physical chemistry of surface coatings are also reviewed. A special chapter is devoted to the fundamentals of the composition and the application of printing inks with reference to the new possibilities offered by synthetic resins. It is realised that some of the basic conceptions cannot yet be fully supported by experiment, but even so they provide food for thought and actual working hypotheses. Many of the phenomena in question can be made visible to the eye by the microscope; a number of descriptive photomicrographs taken under the able direction of Dr. A. V. Blom, head of the Swiss Bureau of Standards, are therefore reproduced. To make the general comments more helpful for the practical formulator a classification of synthetic resins is outlined in an appendix, illustrated by representative examples. There is also a suggestive description of the American method of using such synthetic resins in the actual formulation of varnishes, enamels, and lacquers.

Outlines of Theoretical Chemistry. By Frederick H. Getman. Sixth Edition by Farrington Daniels. Pp. 662. New York: John Wiley and Sons, Inc. London: Chapman and Hall, Ltd. 18s. 6d.

An attempt has been made in this new edition to keep abreast of developments in physical chemistry, to correlate the existing material more fully, and to raise the standards in keeping with the better preparation which students are now bringing to the study of physical chemistry. Since the book had already reached its practical maximum size, it was necessary to make room for new material by omitting much description of apparatus and experimental procedure. Many new problems, however, have been added, and all have been rearranged in sets. Answers are given for the first set, but not for the second set. Many of the problems have been designed to illustrate the material of the text, chapter by chapter. A set of more advanced problems is offered at the end of some of the chapters to meet the requirements for greater originality.

Sprechsaal-Kalender 1938. Edited by Dr. J. Koerner. 402 pp. Coburg: Verlag des Sprechsaal, Müller and Schmidt. RM 2.50.

This diary, in which the subjects are arranged alphabetically, should prove—as in past years—very helpful to all concerned with the silicate industry, especially the ceramist and the glass maker. It enables the reader to find the more important physical, chemical and technical data relating to materials used in these industries.

Catalysis: From the Standpoint of Chemical Kinetics. By Georg-Maria Schwab. Translated from the first German Edition by Hugh S. Taylor and R. Spence. Pp. 357. London: Macmillan and Co., Ltd. 18s.

The significance of catalysis in the field of chemistry is being encouraged by the development of technology on the one hand and scientific biology on the other. New problems are emerging in growing numbers from behind older questions which have been cleared up. For this reason a comprehensive consideration of catalysis from the standpoint of chemical kinetics promises some reward. In this book explanatory experiments and theories—new and old—concerning catalytic phenomena are dealt with briefly. The plan has been to work out the laws which hold for catalysis generally, as well as for its different varieties, and to elucidate and confirm from them the principles by which the influence of catalysts on velocity is possible and by which it occurs. Major importance has been placed on observations which are fundamental to the discussion. In the selection of experimental data, due regard has been paid to their usefulness in the clarification of questions of principle arising in the individual section; no opinion is given regarding the large mass of material which is not taken into consideration. Formulæ have been used only where fundamental and established, or otherwise inexpressible, laws had to be stated. Nearly half of the book is devoted to the subject of heterogeneous catalysis. A short review is given of enzyme catalysis and catalysis in the organism, as far as it can be considered from the standpoint of kinetics and is kinetically connected with catalysis in vitro. It is assumed that the reader has a good knowledge of chemistry, is conversant with the principles of physical chemistry, and has some knowledge of physics and elementary mathematics. On this basis, the author hopes he has made this common border region intelligible to biologists as well as to chemists and physicists.

Production and Development of Nickel, Copper and Platinum Metals

Annual Report of International Nickel Co. of Canada

THE report of the International Nickel Company of Canada, Ltd., for the year ended December 31, 1937, shows a net profit of $50,299,623 after all charges including provision of $10,350,890 for taxes and $8,761,161 for depreciation, depletion, retirement and other purposes. The comparable figure for 1936 was $36,865,526, indicating an increase in net profit of approximately 36 per cent. over that for the previous record year. After disbursement of $1,933,898 for preferred dividends, there remained $48,365,725, equivalent to $3.31 per share on the 14,584,025 shares of common stock outstanding, this compares with $2.39 per share in 1936.

Sales of Metal

Sales of nickel exceeded those of 1936 by 23 per cent., notwithstanding a marked decrease in consumption in the United States during the last quarter. There was an increase in sales of copper over prior years, while sales of the platinum metals, although approaching record volume during the first nine months, decreased sharply in the final months. The price of nickel remained unchanged except for a downward adjustment in the sterling price at the beginning of the year, but the prices realised for copper and platinum declined during the last four months.

Capital expenditures of about $14,000,000 are contemplated for 1938, of which $10,700,000 is planned for Canada, $1,100,000 for Great Britain, $400,000 for the United States and $1,500,000 for the further development of the Petsamon concession in Finland. The improvements planned are not, with the exception of the development in Finland, directed primarily towards increased production, but are designed to effect economies throughout all of the company's plants in an endeavour to offset higher wages, shortened working hours and also taxes and other changes which are beyond the control of the management.

Total sales of nickel in all forms reached 207,700,943 lb. as against 168,927,980 lb. in 1936, the previous record year. These figures compare with 240,000,000 and 200,000,000 lb. respectively, as the estimated world consumption of nickel in all forms from all sources in 1937 and 1936. The increase in world nickel consumption in 1937 over that for 1936 was shared by all of the different industrial fields into which nickel enters. Progress was most prominent in the fields of alloy steel, alloy cast iron, electroplating and nickel silver. The greater volume of nickel sales is reflected in that of copper sales which amounted to 291,880,403 lb. in 1937 as against 265,954,589 lb. in the previous year. The production of nickel, was uniform throughout the year. World copper production, inadequate during the early part of the year to meet demand, was later increased to a rate which exceeded the reduced consumption, and stocks of refined copper increased.

Work of the Copper Development Association

Continuing support was given to the constructive research and market development activities of the Copper Development Association in Great Britain, which in turn co-operates with similar activities in other countries, looking to the broadening of the market for copper and the development of new uses. In the markets of the world copper has retained its place an an important material of construction. The extensive development of communications in European countries generally, as well as the continuance of the housing programmes of several countries in Europe, created a steady demand for copper. The automotive and mechanical refrigeration industries in the United States have been impressive users of copper, and the possibilities for future development of rural and domestic electrification appear promising.

Sales of the platinum metals, important by-products of the nickel operations, were 188,756 ounces in 1937 as compared with 220,980 ounces the previous year. The market for platinum opened the year with an extremely heavy demand from the various industries interested in the metal, accompanied by some speculative buying which was prevalent in many commodities at that time. The price of platinum mounted during this period from $48 per ounce to $68 per ounce on February 1. After subsiding to a lower level, the market during the middle of the year became fairly active, but in the month of August the demand for platinum diminished and the price sagged to $38 at the year-end. Factors affecting the world consumption of platinum during the latter part of the year were cessation of governmental buying, reduced activity in the jewellery trade and a partial liquidation of speculative accumulation which had occurred during the two previous years.

The smelter at Copper Cliff, Ontario, produced 188,169 tons of bessemer matte and 158,100 tons of converter copper. An intensive campaign was conducted by the research laboratory staff to improve the recovery of metals. The progress made has been very gratifying and indicates clearly the valuable assistance this new research laboratory can contribute to process operations.

Capacity having been increased, the nickel refinery at Port Colborne, Ont., produced 147,264,099 lb. of refined nickel.

Manufacturing Activities in Great Britain

The nickel refinery at Clydach, Wales, produced 39,554,965 lb. of pellet nickel and 11,755,800 lb. of nickel salts containing 2,431,130 lb. of nickel. Nickel production is now running at the rate of 42,000,000 lb. per annum and can be increased to 50,000,000 lb. when improvements under way have been completed. The new plant research laboratory, occupied at the end of October, should lead to further metallurgical efficiencies.

The platinum metals refinery at Acton, England, produced 255,165 ounces of by-product platinum metals, comparable with 232,343 ounces in 1936, the larger output being due to the increased volume of nickel operations. The enlarged research and development laboratory became available during the year, and is contributing to plant efficiencies as well as to the development of new uses for the platinum metals.

Production of rolled nickel, monel, " Inconel " and other nickel alloys at the Huntington works totalled 34,367,615 lb., a slight increase over that for 1936. New types of established alloys, including a specially finished monel sheet, have been introduced and the range of sizes and forms extended. At the rolling mill of Henry Wiggin and Co., Ltd., in Birmingham, total output of all products amounted to 11,653,206 lb., an increase of 35 per cent. over 1936; and the nickel content of materials sold increased 42 per cent. over that year.

Ten Years Back

From " The Chemical Age," March 17, 1928

The Powell Duffryn Co. is erecting 36 by-product coke ovens at Bargoed in the Rhymney Valley, which will have a carbonising capacity of about 400 tons a day.

* * * *

It is reported that zinc-producing companies of Upper Silesia, headed by the Giessche Co. and the Hohenlohe, Henckel and Donnersmarck companies, have formed a sulphuric acid syndicate which will become active at the end of December with an estimated increased production amounting to about 200,000 metric tons.

References to Current Literature

Inorganic

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British Overseas Chemical Trade in February

ACCORDING to the Board of Trade returns for the month ended February 28, 1938, imports of chemicals, drugs, dyes and colours were valued at £922,155 as compared with £961,221 for February, 1937, a decrease of £39,066. Exports were valued at £1,669,539, as compared with £2,015,509, a decrease of £345,970. Re-exports were valued at £44,815.

Imports

	Quantities. February 28. 1937.	Quantities. February 28. 1938.	Value. February 28. 1937.	Value. February 28. 1938.
Acids—				
Acetic .. .. cwt.	16,266	8,898	18,497	10,573
Boric (boracic) .. ,,	2,506	2,200	2,495	2,470
Citric .. .. ,,	2,406	1,289	10,015	5,133
Tartaric .. ,,	1,218	2,030	5,067	9,452
All other sorts .. value	—	—	6,497	9,907
Borax .. .. cwt.	210	9,309	156	5,744
Calcium carbide .. ,,	69,393	77,110	42,587	41,868
Fertilisers, manufactured—				
Superphosphate of lime tons	1,729	1,630	4,328	3,900
All other descriptions ,,	1,361	1,943	7,134	11,020
Potassium compounds—				
Caustic and lyes cwt.	8,628	8,600	9,663	8,549
Chloride (muriate) ,,	26,380	36,390	8,295	11,703
Kainite and other potassium fertiliser salts cwt.	115,580	197,985	15,106	24,220
Nitrate (saltpetre) ,,	3,506	2,125	3,197	2,057
Sulphate .. ,,	11,170	20,026	5,012	9,308
All other compounds ,,	8,570	10,038	12,223	13,062
Sodium compounds—				
Carbonate, including soda crystals, soda ash and bicarbonate cwt.	317	—	152	—
Chromate and bichromate .. .. cwt.	3,029	1,199	3,514	1,498
Cyanide .. ,,	2,158	1,000	5,043	2,269
Nitrate .. .. ,,	118,780	203,963	25,804	49,048
All other compounds ,,	23,891	16,324	16,406	16,003
Other Chemical manufactures .. .. value	—	—	253,013	255,350

	Quantities. February 28. 1937.	Quantities. February 28. 1938.	Value. February 28. 1937.	Value. February 28. 1938.
Drugs, medicines and medicinal preparations—				
Quinine and quinine salts .. .. oz.	106,601	94,981	8,984	7,926
Medicinal oils .. cwt.	2,636	2,817	10,208	6,132
Proprietary medicines value	—	—	45,133	64,225
All other sorts .. ,,	—	—	62,362	51,059
Finished dye-stuffs obtained from coal tar cwt.	3,870	2,360	106,527	75,170
Extracts for dyeing ,,	4,401	3,317	11,316	7,100
Extracts for tanning (solid or liquid)—				
Chestnut .. ,,	32,558	21,856	20,949	15,186
Quebracho .. ,,	32,376	26,262	28,044	23,824
All other sorts .. ,,	72,833	58,450	53,820	48,959
All other dyes and dye-stuffs .. .. cwt.	827	1,360	14,495	10,203
Painters' and printers' colours and materials—				
White lead (basic carbonate)' .. cwt.	3,177	4,467	4,528	6,474
Lithopone .. ,,	23,899	21,594	14,144	13,887
Ochres and earth colours cwt.	52,621	24,617	14,709	7,925
Bronze powders and other metallic pigments.. .. cwt.	1,634	1,275	11,551	10,197
Carbon blacks .. ,,	40,680	32,957	58,527	45,599
Other pigments and extenders, dry .. cwt.	43,863	64,018	11,362	13,146
All other descriptions ,,	14,985	8,886	30,358	22,009
Total .. .. value	—	—	961,221	922,155

Exports

	Quantities. February 28. 1937.	Quantities. February 28. 1938.	Value. February 28. 1937.	Value. February 28. 1938.
Acids—				
Citric .. .. cwt.	1,569	2,052	7,186	9,705
All other sorts .. value	—	—	22,228	23,982
Aluminium compounds tons	2,032	1,277	22,940	9,090
Ammonium compounds—				
Sulphate .. tons	23,706	26,188	142,133	166,850
All other sorts .. ,,	1,454	935	18,476	12,625
Bleaching materials—				
Bleaching powder (chloride of lime) .. cwt.	50,420	45,013	13,384	11,929
All other sorts .. ,,	4,415	2,229	11,082	6,257
Coal tar products—				
Cresylic acid .. galls.	263,288	143,637	39,344	26,871
Tar oil, creosote oil ,,	2,679,672	2,173,779	75,973	60,900
All other sorts .. value	—	—	21,597	13,810
Copper, sulphate of tons	6,310	4,092	115,863	69,332
Disinfectants, insecticides, etc. .. .. cwt.	28,596	26,592	58,326	53,788
Fertilisers, manufactured, tons	36,500	15,610	111,080	62,109
Glycerine .. .. cwt.	12,549	9,796	42,992	40,015
Lead compounds .. ,,	11,123	13,198	17,843	18,295
Magnesium compounds tons	412	395	11,237	10,877
Potassium compounds cwt.	3,508	5,152	9,532	10,115
Salt (sodium chloride) tons	17,285	10,476	46,286	33,051
Sodium compounds—				
Carbonate, including soda crystals, soda ash and bicarbonate cwt.	543,321	341,263	102,987	83,067
Caustic .. .. ,,	224,937	126,470	90,301	67,517
Nitrate .. .. ,,	50	79	54	44
Sulphate, including salt-cake .. .. cwt.	44,921	3,020	4,558	1,139
All other sorts .. ,,	72,432	61,018	69,554	63,665
Zinc oxide .. tons	1,153	1,093	23,028	22,551

	Quantities. February 28. 1937.	Quantities. February 28. 1938.	Value. February 28. 1937.	Value. February 28. 1938.
All other descriptions value	—	—	184,904	174,699
Drugs, medicines and medicinal preparations—				
Quinine and quinine salts .. .. oz.	256,446	131,582	23,295	14,756
Proprietary medicines value	—	—	128,496	112,447
All other descriptions value	—	—	133,278	123,101
Dyes and dye-stuffs and extracts for tanning—				
Finished dye-stuffs obtained from coal tar—				
Alizarine, alizarine red and indigo (synthetic) cwt.	2,604	1,711	12,745	9,862
Other sorts .. ,,	7,851	4,973	117,350	63,280
Extracts for tanning (solid or liquid) cwt.	17,172	15,556	14,208	13,578
All other descriptions ,,	3,069	1,292	9,810	6,742
Painters' and printers' colours and materials—				
Ochres and earth colours cwt.	12,028	8,480	12,634	9,089
Other descriptions ,,	16,026	9,235	28,766	25,929
White lead .. ,,	4,409	6,355	10,275	13,458
Ships' bottom compositions .. .. cwt.	2,694	3,211	9,196	12,427
Paints and painters' enamels .. cwt.	41,899	32,838	111,067	97,837
Varnish and lacquer (clear) .. galls.	78,820	53,117	30,047	21,180
Printers' ink .. cwt.	4,121	3,611	23,551	18,677
All other descriptions cwt.	42,889	39,373	87,903	74,893
Total .. .. value	—	—	2,015,509	1,669,539

Re-Exports

	Quantities. February 28. 1937.	Quantities. February 28. 1938.	Value. February 28. 1937.	Value. February 28. 1938.
Chemical manufactures and products .. value	—	—	16,048	32,655
Drugs, medicines and medicinal preparations value	—	—	10,173	10,191
Dyes and dye-stuffs and extracts for tanning cwt.	2,007	806	3,111	1,373
Painters' and printers' colours & materials cwt.	1,603	297	1,169	596
Total of group value	—	—	30,501	44,81

Personal Notes

PROFESSOR W. H. ROBERTS, M.Sc., F.I.C., has been elected president of the Society of Public Analysts for 1938-39.

SIR RONALD MATTHEWS has been elected deputy chairman of General Refractories, Ltd.

SIR RALPH GLYN, Bart., a director of the L.M.S. Railway, has been elected a director of the British Match Corporation, Ltd.

MR. R. A. CORDER has been appointed a director of the Petroleum Storage and Finance Corporation, Ltd., in place of Mr. Nathan Davis, who has resigned.

PROFESSOR F. C. THOMPSON, of Manchester University, has been appointed an external examiner in metallurgy, for the Ph.D. thesis, at Sheffield University.

THE LATE MR. THOMSON JEFFREY AIMERS, of Dublin, late manager of Lawes Chemical Manure Co., left personal estate in England and Eire, valued at £26,555.

THE LATE MR. ALEXANDER JOHN DEY, of Corstorphine, who was managing director of T. and H. Smith, Ltd., manufacturing chemists, left personal estate valued at £24,836.

PROFESSOR WILLIAM LAWRENCE BRAGG, F.R.S., a former director of the National Physical Laboratory, and at present Cavendish professor of experimental physics, has been elected to a professorial fellowship at Trinity College, Cambridge.

DR. O. J. WALKER, lecturer in chemistry, University College, London, and MR. J. SANDILANDS, lecturer in chemistry, Heriot-Watt College, Edinburgh, have been elected Fellows of the Royal Society of Edinburgh.

THE LATE MR. JOSEPH BARTON, of Sheffield, for many years secretary and a director of Henry Bessemer and Co., Ltd., steel makers, who died at the age of 93, left estate valued £70,097, with net personalty £69,353.

MR. F. R. STAGG, a director of Thos. W. Ward, Ltd., has become an assistant managing director of the company. He is a director of the Widnes Foundry and Engineering Co., Ltd., makers of chemical plant, and also assistant managing director of the Ketton Portland Cement Co., Ltd.

DR. W. H. J. VERNON, senior scientific officer of the Chemical Research Laboratory at Teddington, was the guest of the local branch of the Institute of Chemistry, at Sunderland on March 10, when he lectured on "Some recent developments in corrosion research."

MR. A. H. BRUCE, the new president of the Paper Makers' Association of Great Britain and Ireland, is a grandson of the founder of Henry Bruce and Sons, Ltd., Kinleith paper mills, Currie, Midlothian. He became managing director of that company in 1930.

PROFESSOR DR. P. E. VERKADE, professor of chemistry and technological chemistry, Nederlandsche Handels-Hoogeschool, Rotterdam, delivered a lecture on "The role of dicarboxylic acids in Metabolism," at the Thompson Yates laboratories, Liverpool University, March 15.

PROFESSOR G. M. BENNETT has resigned from the chair of chemistry at Sheffield University, on his appointment to a chair of chemistry at King's College, London. DR. M. RITCHIE, assistant lecturer in chemistry, has resigned on his appointment as lecturer in chemistry at Edinburgh University.

DR. PHOEBUS A. LEVENE, a member of the Rockefeller Institute for Medical Research for twenty-one years, has received the William H. Nichols medal of the New York section of the American Chemical Society. Dr. Levene, Russian by birth, delivered an acceptance address on "Optical Rotation as a Tool in Structural and Theoretical Chemistry." He was awarded the medal for his study of the configurational relationships of the simpler optically active organic compounds.

OBITUARY

MR. WILLIAM MCCOMISH, a director of the Albion Sugar Co., Ltd., of Woolwich, has died at the age of 70.

MR. ALEXANDER BUCHANAN, formerly manager of the Dundee branch of Scottish Oils, Ltd., died on March 12, aged 79. He had previously been in the Glasgow office of the Broxburn Oil Co. before its amalgamation with Scottish Oils.

MR. PERCY WILLIAM FAWCETT, O.B.E., well-known in the iron, steel and coal industries, died at his home at Dore, near Sheffield, on March 9, at the age of 66. He was managing director of the Park Gate Iron and Steel Co., Ltd., until last year when he resigned for reasons of health. Chief engineer of Thomas Firth and Sons, Ltd., Sheffield, from 1897 to 1921, he became a director of that company in 1922, and after the amalgamation with John Brown and Co. he continued as a director of the combine. He was also a director of the Staveley Iron and Coal Co., Ltd., the British Soda Co., Ltd., and the Oughtibridge Silica Firebrick Co., Ltd.

Foreign Chemical Notes

Italy

PROMISING NICKEL AND COPPER DEPOSITS have been located near the Swiss frontier at Ossola and Maggiandone.

Denmark

CASEIN MANUFACTURE is to be undertaken by the new-formed A/S Slagelse Kaseintorreri, of Slagelse (capital 16,000 crowns).

Roumania

THE MINISTRY FOR PEASANTS' CO-OPERATIVE AFFAIRS, RUMANIA, has been given power by the Economic Committee of the Government to import from foreign markets any quantity of coppersulphate for home agriculture.

Hungary

PRODUCTION OF OLEINE AND STEARINE has been commenced by the Vienna firm of Gerö and Ofner.

PRODUCTION OF SULPHUR from by-product sulphur dioxide in crude copper manufacture is under consideration by the Mines de Bor, who anticipate 45,000 tons per year.

Czechoslovakia

PERMISSION TO COMMERCE MANUFACTURE of textile assistants, under the style of the Chemotextil, has been granted to Textilhilfsprodukte A.G., Prague.

DIFFICULTIES OF AN ECONOMIC CHARACTER are being encountered in the establishment of a synthetic rubber industry. With the present fluctuations in raw material prices on the world market, synthetic rubber is not considered an economic proposition in Czechoslovakia.

Russia

A NEW SYNTHETIC TANNING AGENT (F-2-K), with phenol as the starting material, has been introduced by the Ukrainian Research Institute.

THE FIRST BATCH OF SYNTHETIC VANILLIN has been produced by the Moscow Experimental Laboratory of the perfume industry.

EXTRACTION OF VITAMIN C from native raw materials is to be undertaken in two factories in the Far East; a third factory is to be elected in the Khirgiz region where wild roses grow in profusion.

NEW PROCESSES FOR DYEING THE FURS of rabbits, pine martens, marmots and other small furred animals have been developed at the Central Research Laboratory of the Fur Industry, with the aid of which it should be possible to dispense with imports of resorcinol and pyrogallol.

From Week to Week

SHELL REFINERIES, LTD., Ardrossan, held their annual dance on March 4.

WILLIAM WOTHERSPOON, LTD., starch works, Paisley, decided to close this week. Nearly 200 employees are idle through over-production.

A GOVERNMENT TECHNICAL COMMITTEE at Capetown, is investigating the British and German processes for the extraction of oil from coal with a view to large-scale production.

WHILE DISCHARGING OIL in the darkness over the pier at Kyle of Lochalsh, the valves of the oil tanker *Sandario*, became out of order, and 200 tons of oil were lost in the sea.

THE AMERICAN CHAMBER OF COMMERCE, Aldwych House, London, W.C.2, announce that their new address (since March 12) is Bush House, London, W.C.2. Telephone No.: Temple Bar 5994.

HUBRON RUBBER CHEMICALS, LTD., of Albion Street, Failsworth, Lancs, have increased their nominal capital by the addition of £10,000 in £1 ordinary shares beyond the registered capital of £10,000.

THE CWMFELIN TINPLATE WORKS, Swansea, owned by Richard Thomas and Co., have been closed down because of the depression in the tinplate trade. About 350 men are affected. There are now 25 idle tinplate works in South Wales, in addition to half the sheet works and several steel works.

THE BRITISH ELECTRICAL DEVELOPMENT ASSOCIATION have issued a series of booklets entitled "Miscellaneous Applications of Electric Heat." These booklets include tar heating (No. 1), heat treatment of iron and steel (No. 2), heat treatment of non-ferrous metals (No. 5), glass and ceramics (No. 8).

A DISMANTLED 20-ACRE CLYDE SHIPYARD is to be the site of a new £40,000 factory to be built at Dalmuir by Turners Asbestos Cement Co. Asbestos-cement pressure pipes and roofing materials will be made. About 350 workers will be employed. Including the plant, the scheme will cost £200,000.

THE ANNUAL DINNER-DANCE of the staff of the South Wales section of the Anglo-American Oil Co., Ltd., was held in Cardiff last week. About 130 staff members, drawn from Cardiff, Bristol, Gloucester, Newport, Swansea, and Cardigan, were present, as well as London members. Mr. T. J. W. Marston presided.

ENGINEERS ENGAGED IN OIL DRILLING near Dalkeith, Scotland, are finding conditions there about as difficult as in any part of the world. Mr. A. H. Chapman, production manager of the Anglo-American Oil Co., Ltd., which markets Esso petrols and Essolube oils, says that the company's well, Midlothian No. 1, has now reached a depth of 2,563 ft.

THE INSTITUTE OF PHYSICS has elected the following new Fellows: V. J. Francis, B.Sc., A.R.C.S.; A. C. Gunstone, G. E. Harrison, B.Sc., Ph.D.; A. S. G. Hill, B.Sc.; O. P. T. Kantorowicz, Dr. Phil.; R. R. Nimmo, M.Sc., Ph.D.; W. D. Oliphant, B.Sc.; S. Rodda, B.Sc.; J. Shearer, B.A., M.Sc.; A. E. Stevens, B.Sc., B.A.; H. Wilman, B.Sc., A.R.C.S., Ph.D., D.I.C.; A. Warmisham, M.Sc.

THE SUPPLEMENT to *Ciba Review* (No. 7) deals with dyeings using Neolan Blue GG. It is stated that extensive practical trials have now shown that the acid alizarine blues can be replaced by Neolan Blue GG which is equally level dyeing when applied by the same method as for ordinary acid colours. Combination shades containing Neolan Blue GG are faster to light and wear, than those produced with acid alizarine blues.

RUBBER HOSE, cables, glass vessels and similar articles when required for service under exacting conditions, particularly as regards abrasion, shock, varying pressures or attack from rodents, can be protected in an economical and presentable form by "Prana" woven wire mesh armouring, which is supplied by Sparklets, Ltd., who have installed plant capable of meeting the most exacting requirements of finish, flexibility, elasticity and strength.

LABORATORY GLASSWARE with standard interchangeable ground glass joints is described and illustrated in catalogue 107A of A. Gallenkamp and Co., Ltd. This type of glassware is now rapidly taking its place in the laboratory and gaining favour with its users, due to the many advantages over the old idea of assembly. The company's new works factory, recently opened, contains the latest designs of machinery for the production of this glassware.

THE ANNUAL MEETING OF THE DECHEMA Deutsche Gesellschaft für chemisches Apparatewesen E.V. (German Chemical Engineering Society) will be held on April 8, in Berlin, at Hofmannhaus, Sigismundstr, 4. Papers to be read will include "The Field of Corrosion Testing" (Professor Dr. F. A. Henglein, Karlsruhe), "Undestructive Testing Methods" (Dr. Ing. R. Berthold, Berlin-Dahlem), and "Resistance of Metallic Constructional Materials Against Hydrochloric Acid" (Dr. E. Rabald Mannheim-Waldhof).

PRICE, STUTFIELD AND CO., LTD., have issued a leaflet calling attention to the problems of solvent recovery, rectification of solvents, air drying, deodorisation, removal and collection of dusts and mists.

OXLEY ENGINEERING CO., LTD., held their first annual whist drive and dance at The Corner House, Moortown, Leeds, on March 10. About 150 persons, comprising employees accompanied by wives and friends, had an enjoyable evening. Mr. H. H. Hollis, chairman and managing director, welcomed the guests. The full board of directors was present.

CHEMISTRY OF THE SOUTHWEST, including developments in petroleum, potash, and sulphur, will be featured at the semi-annual meeting of the American Chemical Society, to be held in Dallas, Tex., April 18 to 21. More than 1,500 scientists representing fifteen professional divisions of the Society are expected to attend.

A REPRESENTATION HAS BEEN MADE to the Board of Trade under Section 10 (5) of the Finance Act, 1926, regarding oxyacetophenone. Any communication should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, London, S.W.1, within one month from March 16.

THE FUEL RESEARCH STATION, East Greenwich, are holding a visiting day on Tuesday, May 31 (2 to 6 p.m.), on the same lines as those held in previous years. Visitors will be given an opportunity of inspecting the laboratories and large scale experimental plants and of obtaining a general insight into the whole range of the fuel research work of the Department.

REDUCED RATES OF CUSTOM DUTIES on certain iron and steel products will not obtain after March 31. The Import Duties Advisory Committee has announced that the period during which reduced rates of duties operated would expire at the end of March. The committee do not propose to make any recommendation to the Treasury for the continuance of reduced rates.

THE ELECTRODEPOSITORS' TECHNICAL SOCIETY will hold a conference at the James Watt Memorial Institute, Gt. Charles Street, Birmingham, 3, on April 5, dealing with "The Deposition of Bright Metal Coatings." Papers will be presented by a number of authors dealing in the main with bright nickel plating, but other metal deposits, particularly bright zinc, will also be discussed.

THE LAST DATE FOR JOINING the forthcoming International Congress of Chemistry, to be held in Rome, May 15 to 21, is April 15, but as the hotel accommodation is rapidly being booked up, much earlier application is desirable. The general organisation of this Congress is detailed in a special circular which can be obtained on application to Professor R. Robinson, F.R.S., Dyson Perrins Laboratory, South Parks Road, Oxford.

THE RUBBER TECHNOLOGY CONFERENCE will be held under the auspices of the Institution of the Rubber Industry May 23-25, at Edward VII Rooms, Hotel Victoria, Northumberland Avenue, London, W.C.2. The secretary to the Conference is Mr. W. F. V. Cox, Institution of the Rubber Industry, 12 Whitehall, London, S.W.1. Methods of improving and evaluating the durability of rubber will be the subject of a special symposium.

THE CITY OF BIRMINGHAM HANDBOOK for 1938, issued by the City Information Bureau, Council House, Birmingham, 1, deals appropriately with the progress of civic government in that City through the century, and illustrates the evolution of the vast municipal machine of to-day from its vague origins. A description of the great airport scheme, the newest form of local government activity, which is due for completion this year is included.

ON THE RECOMMENDATION of the Import Duties Advisory Committee, the Treasury have issued Import Duties (Exemptions) (No. 1) Order, 1938 (S.R. and O., 1938, No. 186), which provides for the addition to the free list of alloys or mixtures of metal, unwrought, in blocks, ingots, cakes, bars, and slabs (whether broken or not), containing not more than 20 per cent. by weight of copper and more than 12 per cent. but not more than 20 per cent. by weight of tin.

STORAGE TANKS containing large quantities of petrol were endangered by a fire which broke out at Purfleet, Essex on March 16. Seven brigades and two Thames firefloats were called to the scene. The outbreak occurred in a dump of 300 tons of waste paper and wood pulp owned by the Thomas Board Mills, Ltd., of Purfleet, and stored on land owned by the Purfleet Wharf and Sawmills, Ltd. The premises are flanked by storage tanks of the Anglo-American Oil and Shell-Mex Companies.

Books Received

British Plastics Year Book, 1938. London: Plastics Press, Ltd. Pp. 596. 15s.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

MANUFACTURE OF CEMENTS.—N. E. Wallace, V. Lefebure, and Imperial Chemical Industries, Ltd. 5507, 5509.

PRODUCTION OF GRANULATED SLAG.—N. E. Wallace, V. Lefebure and Imperial Chemical Industries, Ltd. 5508.

RUBBER-CONTAINING COMPOSITIONS, ETC.—G. W. Worrall, and Imperial Chemical Industries, Ltd. 5788, 5789.

PROCESS FOR THE PRODUCTION OF THE FORMALDEHYDE-SULPHOXYLATE DERIVATIVE of dihydroxydiaminoarsenobenzene base. Zaklady Chemiczne Hydrox Spolka Ograniczona Odpoweidzialnoscia, and A. Ende. 4964.

PRODUCTION OF ARTIFICIAL RESINS.—Allgemeine Elektricitäts-Ges. (Germany, Feb. 26, '37.) 6170.

RESINOUS POLYSTYRENE MOULDING COMPOSITIONS.—Bakelite, Ltd. (United States, May 18, '37.) 6457.

EXTRACTION OF WASTE AQUEOUS LIQUIDS containing phenols.—Chemische Fabrik von Heyden, A.-G. (Germany, Feb. 26, '37.) 6247.

PRODUCTION OF PHOSPHATE FERTILISERS.—Chemische Studien-Ges. Uniwapo. (Germany, Dec. 28, '37.) 6373.

ARYL MONO-SUBSTITUTED OLEFINES.—Distillers Co., Ltd., and H. M. Stanley. 6596.

POLYMERISATION OF OLEFINES.—Distillers Co., Ltd., and H. M. Stanley. 6597.

HEXYL SUBSTITUTED HYDROXYARYL DERIVATIVES.—E. I. du Pont de Nemours and Co., A. S. Carter, and L. Spiegler. 6456.

PRODUCTION OF FAST DYEINGS, ETC.—Durand and Huguenin, A.-G. (Germany, March 1, '37.) 6408.

MANUFACTURE OF SUBSTITUTED ANTHRAQUINONES and aroyl-benzoic acids.—I. G. Farbenindustrie. (Germany, Feb. 27, '37.) 6248.

TREATMENT OF WASTE LIQUORS from chemical processes.—W. V. Gilbert. 6098.

MANUFACTURE OF DIBENZYL.—A. E. Grant, N. Bennett, and Imperial Chemical Industries, Ltd. 6616.

MANUFACTURE OF ACID WOOL DYESTUFFS of the anthraquinone series.—W. W. Groves (I. G. Farbenindustrie.) 5872.

MANUFACTURE OF OXY- AND AMINO-NITRILES, ETC.—W. W. Groves (I. G. Farbenindustrie.) 6001.

MANUFACTURE OF PHTHALOYL-CARBAZOLES containing trifluoromethyl groups.—W. W. Groves (I. G. Farbenindusrtie.) 6250.

MANUFACTURE OF CARBOCYCLIC BASIC PRODUCTS.—W. W. Groves (I. G. Farbenindustrie.) (Oct. 7, '36.) 6558.

SUBSTITUTED ARYL SULPHONIC ACIDS, ETC.—Hercules Powder Co. (United States, May 13, '37.) 6253.

MANUFACTURE OF 1 :3-BUTYLENE-GLYCOL.—I. G. Farbenindustrie. (Germany, Feb. 27, '37.) 6249.

MANUFACTURE OF POLYMETHINE DYESTUFFS.—I. G. Farbenindustrie. (Germany, March 6, '37.) 6410.

MANUFACTURE OF POLYMETHINE DYESTUFFS.—I. G. Farbenindustrie. (Germany, March 4, '37.) 6560.

MANUFACTURE OF POLYMERISATION PRODUCTS OF BUTADIENES-1.3. I. G. Farbenindustrie. (Germany, March 2, '37.) 6584; (Germany, June 2, '37.) 6585.

MANUFACTURE OF CORONES.—I. G. Farbenindustrie, and G. W. Johnson. 6592.

SEPARATION OF MINERALS.—Imperial Chemical Industries, Ltd., (Du Pont de Nemours and Co.). 6295, 6296.

REMOVAL OF GASES, ETC., from gaseous mixtures.—G. W. Johnson (I. G. Farbenindustrie.) 5904.

MANUFACTURE, ETC., OF N-SUBSTITUTED AMINO COMPOUNDS.—G. W. Johnson (I. G. Farbenindustrie.) 6127.

MANUFACTURE, ETC., OF LACQUERS.—G. W. Johnson (I. G. Farbenindustrie.) 6128.

PURIFICATION OF GASES.—G. W. Johnson (I. G. Farbenindustrie.) 6030.

MANUFACTURE, ETC., OF CONDENSATION PRODUCTS.—G. W. Johnson (I. G. Farbenindustrie.) 6031.

MANUFACTURE, ETC., OF 2-METHYL-BUTANEDIOL-1.3.—G. W. Johnson (I. G. Farbenindustrie.) 6032.

MANUFACTURE, ETC., OF ISOPRENE.—G. W. Johnson (I. G. Farbenindustrie.) 6033.

MANUFACTURE, ETC., OF CONDENSATION PRODUCTS.—G. W. Johnson (I. G. Farbenindustrie.) 6277.

MANUFACTURE OF CHLORINATED ORGANIC COMPOUNDS.—A. D. Jones, J. S. Watt, and Imperial Chemical Industries, Ltd. 5921.

DISTILLATION OF COAL, ETC.—F. W. Salisbury-Jones, and R. Nisbet. 6351.

TREATMENT OF ACID BATHS used in metallurgy.—R. J. Kahn. (France, March 4, '37.) 6189.

INSECTICIDES, ETC.—J. Krakauer Mediz-Pharm. Präparate, and Apparate und Präparate W. Frowein. (Germany, Feb. 26, '37.) 6290; (Germany, March 18, '37.) 6291.

PREPARATION OF VISCOUS OILS, ETC.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (Holland, March 12, '37.) 6034.

PRODUCTION OF CAST SYNTHETIC RESINS.—K. Loos. (United States, Feb. 27, '37.) 6266; (United States, March 13, '37.) 6267.

METALLIC ALLOYS.—W. L. Marrian, Ltd., and W. L. Marrian. 6116.

TREATMENT OF ALKALINE CYANIDE SOLUTIONS.—Merrill Co. (United States, July 12, '37.) 6254.

PRODUCTION OF CATION-ACTIVE SUBSTANCES.—Naamlooze Vennootschap Onderzoekingsinstuut Research. (Germany, March 22, '37.) 6067.

PREPARATION OF SULPHONATED ORGANIC MATERIALS.—National Oil Products Co., Inc. (United States, March 2, '37.) 6395.

PRODUCTION OF ALBUMEN-CONTAINING PLASTIC MASSES from urea, etc.—O. Neuss. 6076.

TREATMENT OF MATERIALS CONTAINING SULPHURIC ACID.—Permutit Co., Ltd. (Germany, April 20, '37.) 6171.

PRODUCTION OF LEAD ALLOYS.—Pirelli-General Cable Works, Ltd., and G. Martinez. 6377.

PROCESS, ETC., FOR THE ACTIVATION OF CHEMICAL REACTIONS.—H. Plauson. (Germany, March 17, '37.) 6284.

PREPARATION OF DERIVATIVES OF AROMATIC AMINO-SULPHAMIDES. Richter Gedeon Vegyészeti Gyár Részvenytarsasag. (Hungary, April 29, '37.) 6329; (Hungary, Jan. 31.) 6330.

TREATMENT OF RUBBER FOR PURIFYING, ETC., GASES.—G. H. Mulder-Ruhaak, and H. B. Beer. 6376.

MANUFACTURE OF ENOLIC ETHERS OF KETO-CYCLOPENTANO-POLYHYDROPHENANTHRENE COMPOUNDS.—Schering, A.-G. (United States, Feb. 26, '37.) 6316.

MANUFACTURE OF B-ALKYL SUBSTITUTED ETHYLAMINE DERIVATIVES.—Schering, A.-G. (Germany, Feb. 26, '37.) 6317; (Germany, March 1, '37.) 6318.

REDUCTION OF SEXUAL HORMONES containing carbonyl groups.—Schering, A.-G. (Germany, Feb. 27, '37.) 6319.

MANUFACTURE OF ALCOHOLS OF CYCLOPENTANO-POLYHYDROPHENANTHRENE SERIES.—Schering, A.-G. (Germany, March 1, '37.) 6459.

MANUFACTURE OF ALUMINA.—J. C. Séailles. (France, March 6, '37.) 6285; (France, March 8, '37.) 6286; (France, Jan. 11.) 6287; France, Jan. 25.) 6288.

MANUFACTURE OF WAX MODIFYING-AGENTS.—Standard Oil Development Co. (United States, May 26, '37.) 6235.

DRYING, ETC., OF DISPERSE PIGMENTS.—F. J. Stokes Machine Co., and C. F. Coleman. 6434.

PREPARATION OF DERIVATIVES OF ORGANIC BASES.—Tootal Broadhurst Lee Co., Ltd., F. C. Wood, and W. H. Watson. 5841.

PRODUCTION OF PURIFIED MAGNETITE.—I. de Vecchis. 6009.

EMULSIFICATION OF TARS, ETC.—Woodall-Duckham (1920), Ltd., and E. Arnold. 6514.

MANUFACTURE OF CHLORACETATES.—G. Armstrong and Imperial Chemical Industries, Ltd. 6746.

IMPREGNATING SOLUTION FOR TEXTILES, ETC.—Bolidens Gruvaktiebolag. (Sweden, Aug. 21, '37.) 7206.

PROCESS FOR THE ADSORPTION OF HYDROCARBON-CONTAINING GASES containing polymerising, etc., constituents.—Carbo-Norit-Union Verwaltungs-Ges. (Germany, March 8, '37.) 7294.

MANUFACTURE OF ARTIFICIAL RESINS.—A. Carpmael (I. G. Farbenindustrie). 6752.

MANUFACTURE OF 2-(4¹-HYDROXYPHENYLAMINO)-NAPHTHALENE.—A. Carpmael (I. G. Farbenindustrie). 6994.

MANUFACTURE OF SULPHUR DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie). 7142.

MANUFACTURE OF RESINOUS CONDENSATION PRODUCTS.—A. Carpmael (I. G. Farbenindustrie.) 7143.

MANUFACTURE OF HETEROCYCLIC COMPOUNDS.—H. C. Carrington and Imperial Chemical Industries, Ltd. 7298.

PREPARATION OF DISAZO DYESTUFFS.—Chemical Works, formerly Sandoz. (Switzerland, March 8, '37.) 7107.

PRODUCTION OF DIKETEN.—Consortium für Electrochemische Industrie Ges. (Germany, March 13, '37.) 6756.

PRODUCTION OF SENSITIVE DEVELOPMENT-PROOF GRAINLESS HALIDE-SILVER COLLOIDAL AGGREGATE.—O. Czeija and F. Lierg. (Austria, March 16, '37.) 7047.

MANUFACTURE OF ORGANIC COMPOUNDS.—H. Dreyfus. 6689.

Specifications Open to Public Inspection

PROCESS OF EXCHANGING IONS BETWEEN A SOLUTION and an artificial resin and a manufacture of artificial resins therefor.—I. G. Farbenindustrie. Sept. 3, 1936. 13541/37.

SULPHONATION.—Procter and Gamble Co. Sept. 4, 1936. 19867/37.

MANUFACTURE OF PENTAMETHINE-W-ALDEHYDE HETEROCYCLIC BASES.—I. G. Farbenindustrie. Aug. 29, 1936. 20216/37.

PLASTIC COMPOSITIONS.—Carbide and Carbon Chemicals Corporation. Aug. 29, 1936. 20405/37.

VULCANISATION OF RUBBER.—Wingfoot Corporation. Sept. 1, 1936. 20993/37.

PROCESS OF MAKING ALKALI SUB-SILICATES.—Pennsylvania Salt Manufacturing Co. Sept. 3, 1936. 21880/37.

MANUFACTURE OF POLYMETHINE DYESTUFFS.—I. G. Farbenindustrie. Sept. 3, 1936. 22189/37.

MANUFACTURE OF CONDENSATION PRODUCTS of the diphenylamine series.—I. G. Farbenindustrie. Aug. 28, 1936. 23225/37.

PROCESS FOR OBTAINING HIGH STANDARD AND EASILY FILTERED CALCIUM HYPOCHLORITE.—J. Ourisson. Aug. 29, 1936. 23362/37.

PROCESS FOR THE MANUFACTURE OF LUBRICANTS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Aug. 29, 1936. 23429/37.

MANUFACTURE OF HALOGEN DERIVATIVES OF ACETO PROPYL ALCOHOL.—Research Corporation. Sept. 1, 1936. 23743/37.

PROCESS AND APPARATUS FOR THE PURIFICATION OF GAS from coal, lignite, and the like.—G. Leonet. Aug. 31, 1936. 23762/37.

METHOD OF, AND APPARATUS FOR, ISOLATING MINERALS.—E. I. du Pont de Nemours and Co. Aug. 31, 1936. 23776-7/37.

PROCESS OF AND APPARATUS FOR SEPARATING.—E. I. du Pont de Nemours and Co. Aug. 31, 1936. 23779/37.

PRODUCTION OF FOAM GLASS.—J. Kloubek and B. Weiner. Aug. 31, 1936. 23790/37.

PROCESS OF GLUTAMIC ACID PRODUCTION.—Standard Brands, Inc. Sept. 2, 1936. 23848/37.

PROCESS OF OBTAINMENT OF THE LACTAM OF GLUTAMIC ACID.—Standard Brands, Inc. Sept. 2, 1936. 23849/37.

METHOD FOR THE MANUFACTURE OF SINTERED DOLOMITE.—Klockner-Werke, A.-G. Sept. 1, 1936. 23942/37.

METHOD FOR THE PRODUCTION AND NEW APPLICATIONS OF GRAPHITE METALS.—L. Gutlohn. Sept. 3, 1936. 24156/37.

PRODUCTION OF AMINES.—Kodak, Ltd. Sept. 5, 1936. 24288/37.

Specifications Accepted with Dates of Application

EVAPORATING WOOD-SUGAR SOLUTIONS in concentrated hydrochloric acid.—Naamlooze Vennootschap Internationale Suiker en Alcohol Compagnie International Sugar and Alcohol Co., Isaco. Aug. 22, 1935. 480,610.

MANUFACTURE OF OXAZINES of the anthraquinone series.—W. W. Groves (I. G. Farbenindustrie.) Aug. 25, 1936. 480,693.

MANUFACTURE OF COPPER OXYCHLORIDE.—A. Carpmael (I. G. Farbenindustrie.) Aug. 25, 1936. 480,697.

PRODUCTION OF A MAGNESIUM OXYCHLORIDE suitable for chemical reactions.—I. G. Farbenindustrie. Jan. 4, 1936. 480,698.

MANUFACTURE OF VAT DYESTUFFS of the anthraquinone series. W. W. Groves (I. G. Farbenindustrie.) Aug. 26, 1936. 480,749.

PROCESS FOR THE MANUFACTURE OF VALUABLE PRODUCTS from olefines.—A. Carpmael (I. G. Farbenindustrie.) Aug. 28, 1936. 480,756.

METHOD OF PROTECTING MOLTEN MAGNESIUM and its alloys from the action of air.—Oesterreichisch Amerikanisch Magnesit, A.-G. Oct. 7, 1935. 480,718.

MANUFACTURE OF GELATINE.—J. V. S. Glass, and Imperial Chemical Industries, Ltd. Aug. 27, 1936. 480,712.

BLEACHING OF TEXTILE and other fibrous materials.—W. E. Saxby, Ltd., W. H. Holmes, and C. F. Ward. Aug. 29, 1936. 480,448.

PROCESS FOR THE MANUFACTURE OF LEAD from substances containing lead.—A. Carpmael (I. G. Farbenindustrie.) Aug. 29, 1936. 480,722.

INTRODUCTION OF ARYL GROUPS into α-β-UNSATURATED CARBONYL COMPOUNDS and their derivatives.—Schering-Kahlbaum, A.-G. Sept. 17, 1935. 480,617.

PROCESS FOR THE MANUFACTURE OF SULPHANILIC ACID AMIDES which exert a strong bactericidal action.—H. J. W. France. Feb. 23, 1937. 480,486.

MAKING LACQUERS AND PASTES FROM MIXED POLYMERISATES of vinyl chloride.—Deutsche Celluloid-Fabrik. March 19, 1936. 480,732.

MANUFACTURE OF CELLULOSE SOLUTIONS.—Soc. of Chemical Industry in Basle. April 21, 1936. 480,408.

PREPARATION OF POLYHYDROXY LEUCO DERIVATIVES of triphenylmethane.—Chinoin Gyogyszer es Vegyeszeti Termekek Gyara Reszvenytarsasag (Dr. Kereszty and Dr. Wolf). March 4, 1936. 480,549.

PREPARATION OF NITRO AND AMINO DERIVATIVES and of dyestuffs desired therefrom.—Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimiques du Nord Reunies Etablissements Kuhlmann. March 5, 1936. (Samples furnished.) 480,551.

PROCESS FOR THE MANUFACTURE OF STABLE CALCIUM THIOSULPHATE.—Schering-Kahlbaum, A.-G. Aug. 27, 1936. 480,414.

RECOVERY OF A PRODUCT RICH IN ZINC, from iron ores containing substantial amounts of zinc.—Huttenwerke Siegerland, A.-G. Aug. 4, 1936. 480,566.

SIMULTANEOUS PRODUCTION OF VINYL CHLORIDE and polychlorethylenes.—Dr. A. Wacker Ges. Fur Elektrochemische Industrie Ges. June 16, 1936. 480,568.

MANUFACTURE OF PIGMENTS.—W. H. A. Thiemann (I. G. Farbenindustrie.) June 7, 1937. (Convention date not granted.) 480,640.

PRODUCTION AND RECOVERY OF MOLYBDENUM.—International Hydrogenation Patents Co., Ltd. June 27, 1936. 480,739.

PROCESS FOR THE MANUFACTURE OF STABLE SOLUTIONS of ascorbic acid salts of histidine.—F. Hoffman La Roche and Co., A.-G. July 9, 1936. 480,503.

MANUFACTURE OF VAT-DYESTUFFS.—Soc. of Chemical Industry in Basle. July 9, 1936. 480,573.

FERMENTATION PROCESSES.—W. A. Burton and C. F. Arzberger (Commercial Solvents Corporation (in part)). May 23, 1936. 480,770.

TREATMENT OF TEXTILE MATERIALS and compositions comprising cellulose derivatives for use therein.—J. Craik, C. H. Lilly, and Imperial Chemical Industries, Ltd. May 28, 1936. 480,774.

PREPARATION OF SYNTHETIC RESINS.—A. H. Stevens (Phillips Petroleum Co.). June 24, 1936. 480,777.

DYEING.—W. W. Groves (I. G. Farbenindustrie.) June 30, 1936. 481,096.

MANUFACTURE AND PRODUCTION OF ACETYLENE from hydrocarbons containing more than two carbon atoms in the molecule.—G. W. Johnson (I. G. Farbenindustrie). July 24, 1936. 480,781.

PROCESS FOR THE PRODUCTION OF REGULINE BERYLLIUM and beryllium alloys.—W. H. A. Thiemann (I. G. Farbenindustrie). July 31, 1936. (Cognate Application, 19799/37.) 480,787.

RENDERING CELLULOSIC MATERIAL WATER-REPELLANT.—R. J. W. Reynolds, E. E. Walker, and Imperial Chemical Industries, Ltd. Aug. 26, 1936. 481,099.

SEPARATING SOLUBLE AND VALUABLE CONSTITUENTS FROM SYLVINITE ORES and product or products obtained thereby.—F. B. Dehn (Potash Co. of America). Aug. 26, 1936. 481,100.

CONVERSION OF ALKALI METAL CHLORIDES INTO CARBONATES.—A. Consalvo. Aug. 26, 1936. 480,953.

DYEING AND MANUFACTURE OF INTERMEDIATES THEREFOR.—E. I. du Pont de Nemours and Co., M. A. Dahlen, S. R. Detrick, R. E. Etzelmiller, and F. Zwilgmeyer. Aug. 27, 1936. 481,019.

CORROSION-RESISTANT ALLOYS.—H. E. La Bour. Aug. 28, 1936. 481,105.

PRODUCTION AND APPLICATION OF SYNTHETIC RESINS made from carbohydrate ureide and formaldehyde.—Pagani and C. Aug. 30, 1935. 480,958.

WORKING-UP OF PRODUCTS obtained by solvent extraction or mild hydrogenation of solid carbonaceous materials.—G. W. Johnson (I. G. Farbenindustrie.) Aug. 31, 1936. 481,108.

MANUFACTURE OF SULPHAMIDE.—W. W. Groves (I. G. Farbenindustrie.) Sept. 1, 1936. 480,865.

PRODUCTION OF BASE EXCHANGING MATERIALS.—Electrolux, Ltd. Oct. 18, 1935. 481,110.

PRODUCTION OF PLASTIC COMPOSITIONS.—A. G. Rodwell, and S. H. Colton. Sept. 3, 1936. 480,793.

PROCESS FOR THE MANUFACTURE OF THERAPEUTICALLY VALUABLE GOLD COMPOUNDS.—Schering-Kahlbaum, A.-G. Sept. 13, 1935. (Samples furnished.) 481,164.

MANUFACTURE OF PIGMENT DYESTUFFS.—I. G. Farbenindustrie. Sept. 6, 1935. 481,134.

DYEING LEATHER.—A. Carpmael (I. G. Farbenindustrie.) (Addition to 456,844.) 481,135.

MANUFACTURE AND PRODUCTION OF COMPOUNDS of the 3.4.8.9-dibenzopyrene-5.10-quinone series.—G. W. Johnson (I. G. Farbenindustrie.) Oct. 14, 1936. 480,882.

PREPARATION OF ALKYL SULPHATES.—Standard Oil Development Co. Nov. 29, 1935. 480,886.

ELECTROLYTIC PROCESSES for the manufacture of the alkali earth metals.—D. Gardner. Dec. 4, 1936. 481,040.

CERAMIC MIXTURES.—L. Bonnet. Dec. 12, 1935. 480,982.

REFINING CAPILLARY-ACTIVE ALKYL ESTERS OF SULPHURIC ACID and/or salts thereof in aqueous solutions.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Dec. 24, 1935. 480,904.

PRODUCTION OF HYDROGEN-CONTAINING GASES.—National Coke and Oil Co., Ltd., and J. L. Strevens. Jan. 4, 1937. 480,820.

PREPARATION OF SYNTHETIC DERIVATIVES OF LYSERGIC ACID.—Chemical Works, formerly Sandoz. June 20, 1936. (Samples furnished.) 480,822.

DESTRUCTIVE HYDROGENATION OF COAL in particular bituminous coal.—International Hydrogenation Patents Co., Ltd. March 3, 1936. 481,141.

PREPARATION OF AN ALKALI CYANIDE.—American Cyanamid Co. March 10, 1936. 481,142.

PRODUCTION OF ALUMINA from clay or other aluminous ore.—J. G. Stein and Co., Ltd., and J. F. Hyslop. March 17, 1937. 480,921.

REDUCTION OF SULPHUR DIOXIDE TO ELEMENTAL SULPHUR.—V. F. Feeny (Consolidated Mining and Smelting Co. of Canada, Ltd.). April 22, 1937. 481,059.

TREATMENT OF NATURAL AND ARTIFICIAL CELLULOSE FIBRES with alkali.—Chemical Works, formerly Sandoz. May 2, 1936. 480,837.

PROCESS OF MANUFACTURING PHENOL-ALDEHYDE RESINS or products thereof.—Dorch, Backsin, and Co.'s Aktiebolag. May 26, 1936. 481,069.

AZO-DYESTUFFS FOR LEATHER.—Williams (Hounslow), Ltd., and H. Ackroyd. May 29, 1937. 481,070.

CHROMIUM-MANGANESE STEEL.—Electro Metallurgical Co. (June 11, 1936.) 480,929.

RECOVERY OF CADMIUM.—Metallges, A.-G. Sept. 21, 1936. 480,932.

PREPARING PURE OR SUBSTANTIALLY PURE SALTS OF ACID ESTERS OF POLYBASIC INORGANIC ACIDS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Oct. 10, 1936. 480,940.

Chemical and Allied Stocks and Shares

THE further complications in European political affairs dominated the industrial and other markets of the Stock Exchange. Selling pressure was in evidence and lower prices have ruled as a result, but the undertone was regarded as better than might have been expected. Firmer conditions are looked for shortly, but it is generally believed in the City that markets will remain unsettled, pending the Budget proposals, which are awaited with considerable attention in view of the fear that larger expenditure on armaments will necessitate some increase in direct taxation.

Shares of companies identified with the chemical and allied industries have moved against holders as a result of the surrounding trend of markets. Imperial Chemical continued to show a good deal of activity in advance of the dividend statement and have fluctuated rather sharply. At the time of writing the price is 29s., compared with 28s. 9d. a week ago. Distillers have moved down from 96s. 6d. to 93s. 6d., and Associated Portland Cement from 81s. to 77s. 6d. Turner and Newall are 78s., an improvement of 9d. on the week, while British Oxygen have moved down from 72s. 6d. to 71s. 10½d. and Murex from 80s. to 79s. 6d. Pinchin Johnson show a reaction from 34s. to 30s. 7½d. In the latter case the decline was due in part to the reduction in the dividend to 17½ per cent., as the market had been anticipating the 20 per cent. rate to be maintained, despite the larger capital ranking as a result of last year's 10 per cent. share bonus. Indestructible Paint were relatively steady at 81s. 3d., and Wall Paper deferred shares at 38s. are within 9d. of the price ruling a week ago.

Boots Pure Drug show a decline from 44s. 9d. to 43s. 6d., although there is general confidence the cash distribution of this successful company will be unchanged and that there are possibilities of an eventual share bonus. As in most other cases, the lower share values ruling have to be read in relation to the surrounding market tendency and not as an indication that less favourable views are held with regard to the earning capacity of the business in the future.

Lever and Unilever at 37s. 6d., show a smaller decline than many other prominent shares, hopes of a larger dividend having continued to influence sentiment to some extent. British Oil and Cake Mills preferred ordinary shares at 46s. 3d. were well maintained on the good cover for their dividend requirements indicated by the past year's results. United Premier Oil and Cake ordinary at 7s. 6d. show little change on balance, aided by hopes that the dividend may again be brought up to 12½ per cent. Greeff-Chemicals Holdings 5s. units were inactive, but at 6s. 3d. have been fairly well maintained in price, while at the time of writing Cooper, McDougall and Robertson have kept around 31s. 3d., having remained under the influence of the past year's results. Fison, Packard and Prentice had a steady appearance at 33s. 9d.

Imperial Smelting ordinary at 11s. 9d. are moderately lower, but were inclined to improve subsequently under the influence of the better tendency in the price of zinc. B. Laporte were unchanged at 92s. 6d., but the price was probably not adequately tested by business as the shares continue to be held firmly on the belief that further good results will be shown for the financial year ending this month. In respect of the previous year the dividend was maintained at 22½ per cent., and £20,000, or sufficient to have paid a further 16 per cent. in dividend, was placed to reserve.

Dorman Long, Consett Iron, and Staveley Coal and Iron were lower, but were inclined to improve subsequently on the belief that iron and steel producers will benefit from the speeding-up of rearmament work. International Nickel were better under the influence of the past year's good results. Most dollar shares have, in fact, received more attention as a means of acquiring an interest in American currency. "Shell" and other leading oil shares reflected the general market tendency to lower prices.

Forthcoming Events

London.

March 23.—Institution of Chemical Engineers. Graduates' and Students' Section. S. J. Ralph, "The Design of Chemical Plant."

March 24.—Society of Chemical Industry (Plastics Group) and The Institution of Electrical Engineers. Victoria Embankment, W.C.2. 6 p.m. Dr. Hartshorn, N. J. L. Megson and E. Rushton, "Plastics and Electrical Insulation."

Institute of Fuel. Junior Institution of Engineers, 39 Victoria Street, S.W.1. 6 p.m. Dr. W. H. Hatfield, "Heat Resisting Steels."

March 25.—Institute of Chemistry. 30 Russell Square, W.C.1. 8 p.m. Dr. R. Alan Morton, "The Practical Aspects of Absorption Spectrophotometry."

March 26.—Royal Institution of Great Britain. 21 Albermarle Street, W.1. 3 p.m. W. L. Bragg, "Some Scientific Problems of Industry: Alloys."

Belfast.

March 24.—The Institute of Chemistry. Belfast and District Section. Annual General Meeting. Thompson's Restaurant, Donegall Place. 6 p.m. Address by R. L. Collett.

Glasgow.

March 24.—Institute of Vitreous Enamellers. Royal Technical College. 7.30 p.m. G. M. Logan, "Working Properties and Durability of Enamels."

March 25.—British Association of Chemists. Scottish Section Annual Meeting. Mackay's Hotel, Glassford Street. 7.30 p.m.

Hull.

March 29.—Society of Chemical Industry. Joint Meeting of Yorkshire Section, the Food Group and the Hull Chemical and Engineering Society. 3.45 p.m. Visit to the Refinery of British Cod Liver Oil Producers (Hull), Ltd. 6 p.m. Reception room of the Refinery. K. McLennan, "The Production and Utilisation of Cod Liver Oil"; Dr. G. A. Reay, "Recent Research on the Preservation of Fish as Food"; Dr. J. A. Lovern, "Some Aspects of Variation in the Composition of Fish."

Manchester.

March 21.—Institution of the Rubber Industry. Constitutional Club, St. Ann's Street. Papers, including J. G. Robinson, "Notes on the Analysis of Organic Accelerators," and F. S. Roberts, "The Tendency in Latex Research."

March 23.—British Association of Chemists. Manchester Section Annual Dinner. Engineers' Club, Albert Square.

Sheffield.

March 23.—Society of Chemical Industry. Joint Meeting with the Sheffield Metallurgical Association and the Chemical Engineering Group. 2 p.m. Visit to Messrs. Brown Bayley's Steel Works, Ltd. 7 p.m. Sheffield Metallurgical Club. J. H. G. Monypenny, "Corrosion Resisting Steels for Chemical Plant."

South Wales.

March 29.—Society of Chemical Industry (South Wales Section). J. H. G. Monypenny, "Stainless Steels."

Workington.

March 25.—West Cumberland Society of Chemists and Engineers, Workington Technical College. 7 p.m. Annual General Meeting.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

India.—The Indian Stores Department, Electrical Branch, New Delhi, is calling for tenders, to be presented in India by April 7, for the supply and erection of an electrolytic chlorine gas plant. Firms desirous of offering plant of United Kingdom manufacture can obtain further details of this call for tenders upon application to the Department of Overseas Trade, 35 Old Queen Street, London, S.W.1. (Ref. T.Y. 19143/38.)

Austria.—An agent established at Vienna wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of chemicals, dyes and colours. (Ref. No. 179.)

France.—An agent established at Paris wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of soap. (Ref. No. 184.)

France.—An agent established at Asnières, Paris, wishes to obtain the representation, on a commission basis, of United Kingdom exporters of tunsten ore. (Ref. No. 185.)

British India.—The Director-General, India Store Department, Belvedere Road, Lambeth, London, S.E.1, invites tenders for 19,840 gallons disinfectant fluid, black. Tenders due March 25. Forms of tender 5s.

Canada.—A well-established firm of chemical merchants and agents at Montreal wishes to obtain the representation, on a consignment or purchasing basis, of United Kingdom manufacturers of zinc chloride (fused and granular); blanc fixe; ammonium carbonate and bi-carbonate (powder and lump), for the Dominion. (Ref. No. 172.)

Weekly Prices of British Chemical Products

THE chemical market continues to be affected by the uncertainty in the general outlook and trade in most sections during the past week has been of a restricted character. A slight improvement has been noticeable in the volume of spot inquiries, but orders actually placed cover only small parcels. Most of the consuming industries have already covered their immediate requirements and contract deliveries appear to be going forward with regularity. There are no price changes to record for general chemicals, rubber chemicals and wood distillation products, and quotations throughout the market remain steady at recent levels. Idle conditions continue to prevail in the coal tar section which is experiencing an unusually long spell of inactivity. In the absence of any firm buying orders prices for most products are on a nominal basis.

MANCHESTER.—The trend of events in the international sphere has not tended to inspire confidence on the Manchester chemical market during the past week and the volume of new business put through in most sections has been comparatively small. There has, however, been a fairly steady flow of contract delivery specifications for heavy chemicals, although in this respect there is room for improvement in the rate at which textile dyeing and finishing products are being taken up locally. Price conditions among heavy chemicals remain steady to firm generally. There has been little change for the better as regards business in the tar products and quiet trading has been reported this week, with the tendency of values in several directions still easy and uncertain.

Price Changes

Rises: Chromic Acid; Lead Acetate; Red Lead; Lead Acetate (Scotland).

Falls: Cadmium Sulphide; Pyridine (Manchester).

GLASGOW.—There has been a slight improvement in the demand for general chemicals for home trade during the week, although export inquiries remain very limited. Prices generally continue very steady at about previous figures, lead and copper products being firmer in sympathy with the metal market.

General Chemicals

ACETONE.—**£45 to £47 per ton.**

ACETIC ACID.—Tech, 80%, £30 5s. per ton; pure 80%, £32 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 2s. 6d. per ton d/d Lancs. GLASGOW: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 1s. to 1s. 1d. per lb. d/d in cylinders. SCOTLAND: 10½d. to 1s. 0½d., containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey galvanising, £19 per ton, ex wharf.

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM DICHROMATE.—8½d. per lb. d/d U.K.

ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—Continental material £11 per ton c.i.f., U.K. ports; Cornish White, £12 5s. to £12 10s. per ton f.o.r., mines, according to quantity. MANCHESTER: White powdered Cornish, £16 10s. per ton, ex store.

BARIUM CHLORIDE.—£11 10s. to £12 10s. per ton in casks ex store. GLASGOW: £11 10s. per ton.

BLEACHING POWDER.—Spot, 35/37%, £9 15s. per ton in casks, special terms for contracts. SCOTLAND: £9 per ton net ex store.

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

BORIC ACID.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

CALCIUM BISULPHITE.—£6 10s. per ton f.o.r. London.

CHARCOAL, LUMP.—£6 to £6 10s. per ton, ex wharf. Granulated, £7 to £9 per ton according to grade and locality.

CHROMETAN.—Crystals, 2½d. per lb.; liquor, £19 10s. per ton d/d. station in drums. GLASGOW: 70/75% solid, £5 15s. per ton net ex store.

CHROMIC ACID.—9¾d. per lb., less 2½%; d/d U.K.

CHROMIUM OXIDE.—11d. per lb.; d/d U.K.

CITRIC ACID.—1s. 0½d. per lb. MANCHESTER: 1s. 0½d. SCOTLAND: B.P. crystals, 1s. 0½d. per lb.; less 5%, ex store.

COPPER SULPHATE.—£21 7s. 6d. per ton, less 2% in casks. MANCHESTER: £19 5s. per ton f.o.b. SCOTLAND: £19 5s. per ton, less 5%, Liverpool, in casks.

CREAM OF TARTAR.—100%, 92s. per cwt., less 2½%. GLASGOW: 99%, £4 12s. per cwt. in 5-cwt. casks.

FORMALDEHYDE.—£20-£22 per ton.

FORMIC ACID.—85%, in carboys, ton lots, £42 to £47 per ton.

GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins, £4 12s. 6d. to £5 12s. 6d. per cwt. according to quantity; in drums, £4 5s. 0d. to £4 17s. 6d.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 6s. 4d. per lb. in 7 lb. lots.

LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One-ton lots ex works, barrels free.

LEAD ACETATE.—LONDON: White, £31 10s. ton lots; brown, £35. GLASGOW: White crystals, £32; brown, £1 per ton less. MANCHESTER: White, £32; brown, £31.

LEAD, NITRATE.—£32 per ton for 1-ton lots.

LEAD, RED.—£31 15s. 0d. 10 cwt. to 1 ton, less 2½% carriage paid. SCOTLAND: £32 per ton, less 2½% carriage paid for 2-ton lots.

LITHARGE.—SCOTLAND: Ground, £32 per ton, less 2½%, carriage paid for 2-ton lots.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £7 10s. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 10d. per lb.; powder B.P., 6s. 0d.; bichloride B.P. (corros. sub.) 5s. 1d.; powder B.P. 4s. 9d.; chloride B.P. (calomel), 5s. 10d.; red oxide cryst. (red precip.), 6s. 11d.; levig. 6s. 5d.; yellow oxide B.P. 6s. 3d.; persulphate white B.P.C., 6s. 0d.; sulphide black (hyd. sulph. cum sulph. 50%), 5s. 11d. For quantities under 112 lb., 1d. extra; under 28 lb., 5d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NITRIC ACID.—Spot, £25 to £30 per ton according to strength, quantity and destination.

OXALIC ACID.—£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 to £54 per ton ex store.

PARAFFIN WAX.—SCOTLAND: 3¾d. per lb.

POTASH CAUSTIC.—Solid, £35 5s. to £36 15s. per ton for 2-ton lots ex store; broken, £42 per ton. MANCHESTER: £39.

POTASSIUM CHLORATE.—£36 7s. 6d. per ton. GLASGOW: 4¼d. per lb. MANCHESTER: £37 10s. per ton.

POTASSIUM DICHROMATE.—5¼d. per lb. carriage paid. SCOTLAND: 5¼d. per lb., net, carriage paid.

POTASSIUM IODIDE.—B.P. 5s. 6d per lb. in 7 lb. lots.

POTASSIUM NITRATE.—Small granular crystals, £24 to £27 per ton ex store, according to quantity. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9¾d. per lb. SCOTLAND: B.P. Crystals, 9¾d. MANCHESTER: B.P. 10¾d. to 1s.

POTASSIUM PRUSSIATE.—6½d. per lb. SCOTLAND: 7d. net, in casks, ex store. MANCHESTER: Yellow, 6½d.

SALAMMONIAC.—Firsts lump, spot, £42 17s. 6d. per ton, d/d address in barrels. Dog-tooth crystals, £36 per ton; fine white crystals, £18 per ton, in casks, ex store. GLASGOW: Large crystals, in casks, £37 10s.

SALT CAKE.—Unground, spot, £3 10s. 6d. per ton.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £14 per ton d/d station. SCOTLAND: Powdered 98/99%, £18 10s. in drums, £19 5s. in casks. Solid 76/77° £15 12s. 6d. in drums; 70/73%, £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£19-£20 per ton carriage paid North. GLASGOW: £18 10s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 15s. per ton d/d station in bags. GLASGOW: £13 5s. per ton in 1 cwt. kegs, £11 5s. per ton in 2-cwt. bags. MANCHESTER: £10 10s.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM CARBONATE MONOHYDRATE.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.

SODIUM CHLORATE.—£27 10s. to £32 per ton. GLASGOW: £1 11s. per cwt., minimum 3 cwt. lots.

SODIUM DICHROMATE.—Crystals cake and powder 4¼d. per lb. net d/d U.K. with rebates for contracts. MANCHESTER:

SODIUM CHROMATE.—4¼d. per lb. d/d U.K.
4d. per lb. GLASGOW: 4¼d. net, carriage paid.

SODIUM HYPOSULPHITE.—Pea crystals, £15 5s. per ton for 2-ton lots; commercial, £11 5s. per ton. MANCHESTER: Commercial, £11; photographic, £15 10s.

SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.

SODIUM NITRATE.—Refined, £8 per ton for 6-ton lots d/d. GLASGOW: £1 12s. 0d. per cwt. in 1-cwt. kegs, net, ex store.

SODIUM NITRITE.—£18 5s. per ton for ton lots.

SODIUM PERBORATE.—10%, 9½d. per lb. d/d in 1-cwt. drums.

SODIUM PHOSPHATE.—Di-sodium, £12 per ton delivered for ton lots. Tri-sodium, £15 to £16 per ton delivered per ton lots.

SODIUM PRUSSIATE.—½d. per lb. for ton lots. GLASGOW: 5d. to 5¾d. ex store. MANCHESTER: 4¼d. to 5¼d.

SODIUM SILICATE.—£9 10s. per ton.

SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 12s. 6d.

SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 10s.

SODIUM SULPHITE.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.

SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.

TARTARIC ACID.—1s. 1½d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 1½d. per lb. GLASGOW: 1s. 1d. per lb., 5%, ex store.

ZINC SULPHATE.—Tech., £11 10s. f.o.r., in 2 cwt. bags.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 7d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 6d. to 1s. 7½d. per lb.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARYTES.—£6 to £6 10s. per ton, according to quality.

CADMIUM SULPHIDE.—6s. to 6s. 3d. per lb.

CARBON BLACK.—4d. per lb., ex store.

CARBON DISULPHIDE.—£31 to £33 per ton, according to quantity, drums extra.

CARBON TETRACHLORIDE.—£41 to £46 per ton, according to quantity, drums extra.

CHROMIUM OXIDE.—Green, 10½d. to 11d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

INDIA-RUBBER SUBSTITUTES.—White, 4½d. to 5½d. per lb.; dark 4d. to 4½d. per lb.

LAMP BLACK.—£24 to £26 per ton del., according to quantity. Vegetable black, £35 per ton upwards.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPONE.—30%, £17 to £17 15s. per ton.

SULPHUR.—£9 to £9 5s. per ton. SULPHUR PRECIP. B.P., £55 to £60 per ton. SULPHUR PRECIP. COMM., £50 to £55 per ton.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quantity.

VERMILION.—Pale, or deep, 5s. per lb., 1-cwt. lots.

ZINC SULPHIDE.—£58 to £60 per ton in casks ex store, smaller quantities up to 1s. per lb.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—The following prices have been announced for neutral quality basis 20.6% nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1938: November, £7 8s.; December, £7 9s. 6d.; January, 1938, £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.

CALCIUM CYANAMIDE.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1938: November, £7 10s.; December, £7 11s. 3d.; January, 1938, £7 12s. 6d.; February, £7 13s. 9d.; March, £7 15s.; April/June, £7 16s. 3d.

NITRO CHALK.—£7 10s. 6d. per ton up to June 30, 1938.

SODIUM NITRATE.—£8 per ton for delivery up to June 30, 1938.

CONCENTRATED COMPLETE FERTILISERS.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.

AMMONIUM PHOSPHATE FERTILISERS.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

Coal Tar Products

BENZOL.—At works, crude, 9¼d. to 9¾d. per gal.; standard motor, 1s. 2¾d. to 1s. 3¼d.; 90%, 1s. 3¾d. to 1s. 4¼d.; pure, 1s. 7¾d. to 1s. 8¼d. GLASGOW: Crude, 10d. to 10½d. per gal.; motor, 1s. 4d. to 1s. 4½d.

CARBOLIC ACID.—Crystals, 7¾d. to 8¼d. per lb., small quantities would be dearer; Crude, 60's, 3s. 3d. to 3s. 6d.; dehydrated, 4s. 4½d. to 4s. 7½d. per gal. MANCHESTER: Crystals, 8d. per lb. f.o.b. in drums; crude, 3s. to 3s. 6d. per gal.

CREOSOTE.—Home trade, 6d. to 6⅝d. per gal., f.o.r. makers' works; exports, 6⅜d. to 6½d. per gal., according to grade. MANCHESTER: 4½d. to 5¼d. GLASGOW: B.S.I. Specification, 6d. to 6¼d. per gal.; washed oil, 5d. to 5½d.; lower sp. gr. oils, 5⅜d. to 6¼d.

CRESYLIC ACID.—97/99%, 3s. to 3s. 3d.; 99/100%, 4s. to 4s. 6d. per gal., according to specification; Pale, 99/100%, 3s. 8½d. to 3s. 11½d.; Dark, 95%, 2s. 7½d. to 2s. 10½d. per gal. GLASGOW: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale, 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. to 2s. 6d. American specification, 3s. 9d. to 4s. MANCHESTER: Pale, 99/100%, 3s. to 3s. 3d.

NAPHTHA.—Solvent, 90/160, 1s. 6d. to 1s. 7d. per gal.; solvent, 95/160%, 1s. 7d. to 1s. 8d., naked at works; heavy 90/190%, 1s. 1¼d. to 1s. 3d. per gal., naked at works, according to quantity. GLASGOW: Crude, 6½d. to 7¼d. per gal.; 90%, 160, 1s. 5d. to 1s. 6d., 90%, 190, 1s. 1d. to 1s. 3d.

NAPHTHALENE.—Crude, whizzed or hot pressed, £6 10s. to £7 10s. per ton; purified crystals, £14 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £5 10s. to £7 per ton. GLASGOW: Fire lighter, crude, £6 to £7 per ton (bags free). MANCHESTER: Refined, £16 per ton f.o.b.

PITCH.—Medium, soft, 34s. to 36s. per ton, f.o.b. MANCHESTER: 32s. 6d. f.o.b., East Coast. GLASGOW: f.o.b. GLASGOW: 35s. to 37s. per ton; in bulk for home trade, 35s.

PYRIDINE.—90/140%, 13s. 6d. to 15s. per gal.; 90/160%, 10s. to 13s. 3d. per gal.; 90/180%, 3s. 3d. to 4s. per gal. f.o.b. GLASGOW: 90% 140, 10s. to 12s. per gal.; 90% 160, 9s. to 10s.; 90% 180, 2s. 6d. to 3s. MANCHESTER: 12s. to 13s. 6d. per gal.

TOLUOL.—90%, 1s. 10d. per gal.; pure, 2s. 2d. GLASGOW: 90%, 120, 1s. 10d. to 2s. 1d. per gal.

XYLOL.—Commercial, 2s. 1d. per gal.; pure, 2s. 3d. to 2s. 3½d. GLASGOW: Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £7 10s. to £8 per ton; grey, £9 10s. to £10. MANCHESTER: Brown, £9 10s.; grey, £11 10s.

METHYL ACETONE.—40.50%, £35 to £40 per ton.

WOOD CREOSOTE.—Unrefined, 4d. to 6d. per gal., according to boiling range.

WOOD NAPHTHA, MISCIBLE.—3s. 3d. to 3s. 6d. per gal.; solvent, 3s. 6d. to 3s. 9d. per gal.

WOOD TAR.—£2 to £8 per ton, according to quality.

Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZIDINE, HCl.—2s. 7½d. per lb., 100% as base, in casks.

BENZOIC ACID, 1914 B.P. (ex toluol).—1s. 11d. per lb. d/d buyer's works.

m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.

o-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.

p-CRESOL, 34·5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.

DICHLORANILINE.—2s. 1½d. to 2s. 5½d. per lb.

DIMETHYLANILINE.—Spot, 1s. 7½d. per lb., package extra.

DINITROBENZENE.—8½d. per lb.

DINITROCHLORBENZENE, SOLID.—£79 5s. per ton.

DINITROTOLUENE.—48/50° C., 9¼d. per lb.; 66/68° C., 11d.

DIPHENYLAMINE.—Spot, 2s. 2d. per lb., d/d buyer's works.

GAMMA ACID, Spot, 4s. 4½d. per lb. 100% d/d buyer's works.

H ACID.—Spot, 2s. 7d. per lb.; 100% d/d buyer's works.

NAPHTHIONIC ACID.—1s. 10d. per lb.

β-NAPHTHOL.—£97 per ton; flake, £94 8s. per ton.

α-NAPHTHYLAMINE.—Lumps, 1s. 1d. per lb.

β-NAPHTHYLAMINE.—Spot, 3s. per lb.; d/d buyer's works.

NEVILLE AND WINTHER'S ACID.—Spot, 3s. 3½d. per lb. 100%.

o-NITRANILINE.—4s. 3½d. per lb.

m-NITRANILINE.—Spot, 2s. 10d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 10d. to 2s. 3½d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.

NITRONAPHTHALENE.—10½d. per lb.; P.G., 1s. 0½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.

SULPHANILIC ACID.—Spot, 8¾d. per lb. 100%, d/d buyer's works.

o-TOLUIDINE.—11½d. per lb., in 8/10-cwt. drums, drums extra.

p-TOLUIDINE.—2s. per lb., in casks.

m-XYLIDINE ACETATE.—4s. 8d. per lb., 100%.

New Companies Registered

Ace Products (Mancnester), Ltd. 337,316.—Private company. Capital £1,000 in 1,000 shares of £1 each. To adopt an agreement with John F. Ingle, and to carry on the business of manufacturers of and dealers in chemicals, gases, drugs, etc. Directors: Tom Read Lee, 4 Ashfield Terrace, Appley Bridge, near Wigan; John F. Ingle.

James Anderson and Company (Colours), Ltd. 20,224.—Private company. Capital £40,000 in £1 shares. To carry on the business of manufacturers of and dealers in colours, dyestuffs, pigments, paints, oils, bleaches, drugs and other chemical products, etc. Subscribers: William Hume, 42 Clouston Street, Glasgow, N.W.; A. I. Robertson.

Jones Gas Process Company, Limited. 337,343.—Private company. Capital £6,000 in 6,000 shares of £1 each. To promote the use of process and apparatus for the manufacture of gas from oil, tar or other hydrocarbons, whether by the gas undertakings, municipal corporations and industries, or otherwise, and whether in the U.K., or elsewhere. Directors: Alan P. Good, Northchurch Farm, Northchurch, near Berkhampsted; Wilfred M. Ratcliffe, Sidney G. Wood, Geoffrey M. Gill, Leon B. Jones.

Harold Wilson and Witco, Ltd. 337,369.—Private company. Capital £25,000 in 25,000 shares of £1 each. To carry on the business of manufacturers, preparers for market, importers and exporters of and dealers in all kinds of goods, wares and merchandise, and in particular of chemicals, chemical products, colours and raw materials of all kinds, etc. Subscribers: E. Belton, 18 Austin Friars, E.C.2; Raymond Harris. The first directors are Robert L. Wishnick, Harold Wilson, Thomas F. Dunn, Francis C. Howard.

Oriental Proofing Company, Ltd. 337,034.—Private company. Capital £100 in 100 shares of £1 each. To carry on business as manufacturers, importers, buyers and sellers of and dealers in chemicals and chemical preparations of all kinds, including preparations for the treatment of fabrics and other materials in order to render them moistureproof, etc. Directors: Colin J. C. E. Healey, Flat 17, Kensington Palace Mansions, W.8; Charles H. Chaldecott. Registered office: St. Leonards Works, Hancock Road, E.3.

Vidux Chemical Manufacturers, Ltd. 336,905.—Private company. Capital £100 in 100 shares of £1 each. To manufacture and deal in all goods, products and things the subject of the formulae or specifications supplied by Dr. Walter Mayer or which are of an allied or similar nature, including chemical cleaners, fire extinguishers, purifiers, water softeners, leather dressings, polishes, antifreezing mixtures, paints, metals, compounds, alloys, amalgams, resins, dyes, fixatives, glues and devices of all sorts. Directors: George A. James, Yew Tree Cottage, Much Hadham, Herts.; Walter Mayer, William J. B. Pollock, Hellmuthe Elbrechter. Registered office: 83 Great Portland Street, W.1.

Bradesh, Ltd. 337,561.—Private company. Capital £1,000 in 1,000 shares of £1 each. To carry on the business of manufacturers, refiners, importers and exporters of and dealers in edible oils and fats, greases, waxes, chemicals, foodstuffs, etc. Directors: Ernest Bradshaw, 37 Alexandra Grove, North Finchley, N.12; Stuart C. Eschmann, Lawrence Bradshaw. Registered office: 111 King's Road, N.W.1.

Graham-Dene Laboratories, Ltd. 337,574.—Private company. Capital £1,500 in 1,500 shares of £1 each. To carry on the business of manufacturers, importers and exporters of and dealers in disinfectants, germicides, insecticides, soaps, detergents, oils, cleaning and laundry requisites, toilet articles, etc. Directors: Winifred M. Tearle, 17a Belsize Avenue, Hampstead, N.W.3; Arthur E. Main. Registered office: 61 Fore Street, E.C.2.

Marine Chemicals Company, Ltd. 337,191.—Private company. Capital £1,500 in 1,000 6 per cent. non-cumulative participating preference shares of £1 and 10,000 ordinary shares of 1s. To carry on the business of dealers in and producers and manufacturers of minerals, ores, metals, chemicals, etc. Subscribers: Ernest H. Ford, 147 Grosvenor Road, Westminster, S.W.1; B. R. Everett. Registered office: 147 Grosvenor Road, Westminster, S.W.1.

Fenton Bros. and Tarpey, Ltd. 336,788.—Private company. Capital, £5,000 in 5,000 shares of £1 each. To acquire the business of a drysalter, oil and colour man, mill furnisher, dealer in wall papers, brushes, chemicals and other preparations and articles, compounds, cements, oils, paints, pigments and varnishes, drug, dyeware, paint and colour grinder and maker of and dealer in proprietary articles formerly carried on by the late Anthony V. Tarpey at Bury as "Fenton Bros. and Tarpey." Directors: Chas. F. Whowell, Croich Hey, Tottington, Lancs., bleacher; Major Ernest A. North, T.A. Registered office: 15 Market Street, Bury.

Ribble Paints and Varnishes, Ltd.—337,385.—Private company. Capital £26,250 in 14,000 5 per cent. cumulative participating preference and 12,250 ordinary shares of £1 each. To adopt an agreement with Bruce Critchley; and to carry on the business of merchants, shippers, exporters, importers, brokers and factors of, wholesale and retail dealers in, and manufacturers and refiners of all classes of paints, distempers, varnishes, white and colour washes, lacquers, japans, gold leaf, enamels, coatings and preservatives, polishes, compounds, cements, oils, chemicals, spirits, sizes, pastes, pigments, gums, glues, colours and dyes, floor, wall and ceiling coverings, brushes and painters' and decorators' instruments and accessories, etc. Directors: Harold Hey, "Glengoyt," Strines, Derbyshire; John S. Southworth, Alan Southworth, Bruce Critchley, Stephen B. Tiplady, William Cook. Registered office: Redcap Works, Accrington Road, Blackburn.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Bankruptcy Information

WOODS, RICHARD EDWARD, 16 Belsize Crescent, Hampstead, Middlesex, and carries on business at 25 Victoria Street, Westminster, manufacturing chemist. (R.O., 19/3/38.) Receiving Order, March 7, 1938. Creditor's Petition. First meeting, March 23, 1938, 11 a.m., Bankruptcy Buildings, Carey Street, London, W.C.2. Public examination, May 3, 1938, 11 a.m., Bankruptcy Buildings, Carey Street, London, W.C.2.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ENGLISH MANUFACTURING CHEMISTS, LTD., London, S.W. (M., 19/3/38.) January 19, £246,379 16s. 10d. charge, to Timothy Whites and Taylors, Ltd.; charged on a series of £296,000 notes issued by Phosferine (Ashton and Parsons), Ltd., to the company on July 13, 1936. * Nil. December 17, 1936.

Satisfaction

HELLIWELL AND CO., LTD., Brighouse, glass manufacturers, etc. (M.S., 19/3/38.) Satisfaction March 3, of charge registered January 8, 1921.

Company News

Imperial Smelting Corporation, Ltd., announce that the dividend on 6½ per cent. preference shares for half-year ended December 31, 1937, is payable April 1, less tax.

Permutit, Ltd., show a net profit for 1937 of £10,068 (£19,417); dividend of 8 per cent. (same); written off patents, etc., £747 (£920); forward, £10,268 (£11,567).

Greeff-Chemicals Holdings have declared a dividend on the 5½ per cent. cumulative preference stock in respect of half-year ending March 31, 1938, payable on that date.

Boots Pure Drug Co., Ltd., have declared the usual dividend for the quarter ending March 31, 1938, of 6 per cent., less tax, to be paid on March 31 to ordinary shareholders on record on March 10. For many years past the total dividend has been 24 per cent., less tax, together with a bonus of 5 per cent., tax free.

British Oil and Cake Mills, Ltd., announces an increase in trading profits and investment income, etc., from £717,729 to £767,572. Tax absorbs £114,268, against £66,612, while in addition £9,250 is required for N.D.C. Net profits thus show a small decline from £574,987 to £566,737. The ordinary dividend is maintained at 10 per cent. for the third successive year, leaving the carry-forward slightly higher at £51,764.

Lancashire Steel Corporation, Ltd., which is controlled by Securities Management Trust, Ltd., made further striking progress in 1937. Total profits jumped by £256,561, to the peak level of £804,765. Tax (which this time includes N.D.C.) requires £235,169, against £97,403, leaving net profits up by £96,829 at £393,396. The ordinary dividend is raised by 2 per cent., to 7 per cent. The reserve allocation is increased from £25,000 to £100,000, and the staff fund again receives £25,000, leaving the carry-forward at £78,071, compared with £76,732.